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USSR Report

AGRICULTURE

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31 July 1984

USSR REPORT AGRICULTURE

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MAJOR CROP PROGRESS AND WEATHER REPORTING

WEATHER PROBLEMS, PLANTING PROGRESS IN NORTHERN KAZAKHSTAN

Delays in Cereal Planting

Moscow SEL'SKAYA ZHIZN' in Russian 9 May 84 p 1

[Article by SEL'SKAYA ZHIZN' Correspondent A. Kostyukov from Tselinograd: "The Virgin Lands Before Sowing"]

[Text] During the present spring the weather in the virgin lands has changed every day. At one minute it was hot, the next it froze, at one time it was dry and the next moment it rained. Up until the last days of April, when finally a steady warmth set in, in many places there was still snow on the fields. Usually during this time the main concern of the farmers is for moisture. But this year, according to the overall estimate, there are sufficient supplies of moisture in the soil for the grain crops to sprout closely and cluster well. Now, with the approaching planting time, the grain growers are most concerned for the delay in warmth.

Recently we were talking about the spring with the brigade leader from the Tselinograd Zhuravlevskiy Sovkhoz, A. I. Gavrilov. Last year, his brigade, having achieved outstanding results, became the winner of the republic competition of contracting collectives. The 17 equipment operators had raised grain on 5,650 hectares. From each of these hectares last autumn they threshed 2.7 quintals of grain more than as a whole for the farm, having spent on the production of 1 quintal just 0.28 man-hours which is one-half the amount of the average sovkhoz indicator.

With increased labor productivity, naturally, the effectiveness of carrying out the field work has risen. This is important in any event. But at present, in the opinion of A. I. Gavrilov, it is specially important.

"In our virgin lands the best crops are produced by fields which are planted during the last 10 days of May," he related. "But when we cannot rely on our own forces, we try to move the plantings up. But in such a spring, if there are still weeds, hurrying does no good. It is better to start later but plant faster. And before this the soil has to be tilled well."

The brigade is counting on completing the sowing in a few days. According to this plan, each unit of five drills must plant 85-90 hectares a day. Are they up to such a quota?

"This is not the first time we have done this," replied the brigade leader. "Sowing is just the beginning of everything. It happens once a year and we feel that during this time we can get by with a little sleep. Moreover, we are on contract and it matters to us that our fields produce."

A collective contract is a reliable guarantee for high labor and production discipline. Many persons on the Zhuravlevskiy Sovkhoz are persuaded of this. From the example of Gavrilov's brigade, as of the current year all the tractor and crop raising brigades have converted to cost accounting.

The number of such collectives this year has increased everywhere. In Kokchetav Oblast 62 percent of the plowed land has already been assigned to them and in Northern Kazakhstan Oblast 56 percent. On many farms, this work has been anticipated by consolidating the crop rotation, bringing the area of the fields up to 450-700 hectares and making it possible to employ the equipment more productively.

The area of the grain field in the virgin lands is 15 million hectares. A single standard farming method is not suitable for such a field. The annual accomplishments of the grain growers such as the Voskhod Sovkhoz in Northern Kazakhstan Oblast, Zlatopol'skiy Sovkhoz in Kokchetav, Sandyktavskiy Sovkhoz in Tselinograd Oblast and a whole series of other farms are to be explained precisely by the originality of the farming methods. For example, the Voskhod Sovkhoz employs the smoothing of the plantings while the Zlatopol'skiy Sovkhoz employs rolling. In following the experience of previous years, in planning the cross-sowing of cereals, the agronomists from the Zlatopol'skiy and Sandyktavskiy Sovkhozes have set different sowing rates and for each individual field of the rotation. The chief agronomist of the Voskhod Sovkhoz, L. U. Koretskiy, also does not allow any routineness in the presowing tilling of the fields. According to his observations the wheat, barley and oats have different requirements, for example, on soil compactness.

As of now it is hard to say in the present spring how the experience of these farms can be adopted on the fields of other kolkhozes and sovkhozes. However, in the work plans of many agronomists provision has been made for expanding the area of cross-sowing of cereals, particularly for barley. At present, the presowing working of the soil has been noticeably differentiated. In Tselinograd Oblast, in each rayon there are one or two farms the specialists of which have worked on the sowing plans together with scientists from the VNII [All-Union Scientific Research Institute] for Grain Growing. The aim of their collaboration is to work out rayon farming systems.

But with all the diversity of the zonal conditions, there still are farming principles dictated by the particular features of the spring. One of them, as was already pointed out by A. I. Gavrilov, is the concentrating of the sowing dates. In previous years in different zones and even farms a varying attitude was shown to the early spring cultivation of the soil. For some this was an obligatory procedure while others did it selectively.

It is important not so much for covering over the moisture as it is for causing the weeds to grow. In order to warm the soil faster, the sovkhoz agronomists, in addition to the BIG-3 tine harrows, have decided to employ flat-disc tillers.

Ring rollers are also run over the fields tilled in this manner. The rolling, incidentally, is also planned after the intermediate cultivation, if it is not needed now.

Unfortunately, there are reasons to speak of this in such detail. In the first place, many people in the virgin lands year after year are late in starting the early cultivation, waiting until the fields are so dried out that the Kirov tractors can be used. Secondly, recently the farms here have often replaced the spring harrowing with autumn. This produces good results but now this may not be enough. Thirdly, only on a few kolkhozes and sovkhozes do they roll the soil after the tillers and cultivators. This has been reflected in the supply of rollers for the farms. In Tselinograd Oblast, for example, there are sovkhozes which have just 3-5 ring rollers each. At the same time, the experience of the leading farm collectives show that under the conditions of Northern Kazakhstan, the rolling of the soil is in no way superfluous.

At present, more than ever before, the virgin land farmers have more opportunities to carry out the spring work according to the complete program without cutting back on anything or sacrificing anything. In the autumn much fall plowing was done and hence the amount of spring plowing is slight. Moreover, in virtually all the oblasts and rayons the state of readiness of the machine-tractor fleet is higher than in previous years. Generally there is every condition from the very first day of sowing to fight for a high harvest. More organic fertilizer has been transported to the fields than in previous years and the deliveries of manure have risen. Good seed has been prepared for planting. For example, on the farms of Kellerovskiy, Arykbalykskiy and Shchuchinskiy Rayons in Kokchetav Oblast, from 60 to 78 percent of the seed grain is first class.

In truth, unfortunately, this cannot be said about the neighbors, the sovkhozes and kolkhozes in Northern Kazakhstan Oblast. They have prepared their own seed for two-thirds of the grain plantings and had to take more than 100,000 tons of seed grain from the state resources.

In the spring plans of the grain growers there is a point which merits particularly close attention. It is a question of the planting of the durum varieties of wheat. As is known, there is a great need for this but in Northern Kazakhstan Oblast there are few plantings. In the winter there was no agricultural meeting at which the speakers forgot to mention the necessity of broadening the area planted under this crop. But spring arrives and not a trace of the good intentions remains. Seemingly the situation will be repeated this year. In any event, as yet there is no one in sight wanting to expand the plantings of durum wheat. Although recently in the zone new varieties have been regionized such as Altayakaya, Bezenchukskaya-139 and Almaz and these are almost as good as the soft wheats in terms of yield. Obviously the farmer must again be reminded of his obligation to supply the state with more high-quality grain.

Progress in Grain Sowing

Moscow SEL'SKAYA ZHIZN' in Russian 24 May 84 p 1

[Article by SEL'SKAYA ZHIZN' Correspondents I. Puzyrev and A. Kostyukov from Northern Kazakhstan: "The Virgin Lands Are Being Planted"]

[Text] According to the data of the TsSU [Central Statistical Administration] on 21 May, the spring crops in the nation occupied 102.4 million hectares. The grain and pulse (minus corn) crops had been planted on an area of 57.5 million hectares. Wheat occupied 16.8 million hectares, barley 18.9, millet 1.7, buckwheat 0.8 and corn grown for grain 3.8 million hectares. Potatoes and vegetables were planted on 4.2 million hectares. The front of spring field work is moving to the East of the nation.

May finally smiled and the virgin land farmers now have a real spring sun. Until the very planting day with sparse breaks here, cold storm clouds with rain and snow floated over the steppe.

In Northern Kazakhstan, in contrast to the other regions of the nation, the planting of the spring cereals on all farms in any year usually started on the same day, 15 May. This was caused, on the one hand, by the zone's natural conditions and on the other by the technical capabilities of the farms. Now for the first time the virgin land farmers have had to deviate from this year's-long tradition. Having arrived at the designated day at the Tselinograd Izhevskiy Sovkhoz at the brigade of I. A. Trenenkov, we found the operators and the equipment not in the field but at the brigade camp.

"We are waiting for the weeds to appear," explained the brigade leader. "This year they are in no hurry because of the colds. And it makes no sense for us to hurry. You cannot plant in weedy ground...."

"We are risking nothing!" said the sovkhos director N. D. Zhanguarazov in support of the brigade leader. "During the driest years the sovkhos had plenty of grain but now we are not about to miss a crop with this problem."

The planting units were not in the fields on 15 May on virtually all the farms of the northern oblasts of Kazakhstan. They began the mass sowing of wheat on 18 May.

The delay with the start of sowing in no way contradicts the firm grain growing rule which we have frequently repeated: the spring day feeds the year. Quite the contrary, the decision of the virgin land farmers in a way shows up still another aspect of the profound sense of this rule. The "hitch" at the start provided an opportunity for the soil to mature and wait for the sprouting of the wild oats which were quickly cleared from the fields.

"I have worked for many years in the virgin lands," said the director of the Kustanay Sovkhoz imeni Shcherbakov, I. F. Senchev, sharing his reflections, "and I remember each planting season. Of course, I will not forget the present

spring. Not because it has been exceptionally bad but because we, the farm leaders and specialists, possibly for the first time truly felt confident in our knowledge and experience. It is easy to say hold up the planting time by 2 or 3 days! Moreover, in the local press out of tradition the recommendation was published of "plant at the best time and with high quality" and the authors reminded us of certain rudimentary truths. Unfortunately, they did not decide to say frankly and directly that because of the weather we should not be in a hurry to plant. Thanks to M. Suleymenov, the deputy director of the VNII for Grain Raising who in the article "Protect the Plantings Against Wild Oats" published in SEL'SKAYA ZHIZN' dispelled our doubts. Without cunning and superfluous diplomacy the scientist cautioned the production workers against a hurried step.

No matter how capricious the virgin land spring is now, at the main point it is still much to the liking of the farmers as the soil has moisture. If one considers the seed quality which almost everywhere is high and the amount of fertilizer which is more, if it is considered that virtually all the cereals are being planted on fallow or often plowed land, there is every hope for a good crop. The farmers from the Sovkhoz imeni XXII Parts'yezd Kikchetavskoy oblasti, for example, have boldly accepted the obligation of completing the five-year plan for grain this year.

The grain growers from the Izhevskiy Sovkhoz, just waiting for the hour to start planting, immediately set a pace to "win back" the days in the enforced delayed start. Incidentally, all the sovkhoses and kolkhoses in Tselinograd Oblast have accepted a decision to reduce the length of the planting season by 3 days. The equipment operators are preparing the soil around the clock while on farms where equipment is lacking they are even planting at night. In the leading brigades, daily output for each planting unit has reached 80-90 hectares. As a result, the farmers in the oblast have established a set system, planting up to 240,000 hectares in recent days.

The farms of Kustanay Oblast have prepared seriously for the planting season as here is located the largest grain field of Kazakhstan with over 4 million hectares, including 3 million hectares under wheat. The rayon party committees and the RAPO [rayon agroindustrial association] councils, in commending the creative initiative of the grain raisers, from the first days of sowing established strict supervision so that each demand of the soil protective procedures was observed without fail.

The planting season of the present year is the continuation of the great and intense work done to improve farming methods and increase the yield of the virgin land hectare. The Kustanay farmers, for example, are completing the introduction of crop rotations and are broadening the area under fallow which has now been brought up to 17 percent of the plowed lands, that is, virtually to the optimum amount.

The first concern for the grain growers during these spring days is the quality of the field work. In Northern Kazakhstan Oblast, the Voskhod Sovkhoz is considered to be the standard for farming methods. Even in the past, in the exceptionally dry years, it harvested 25.9 quintals of grain in round figures. In the virgin lands, no one succeeded in surpassing it. Of course, much has been heard about the experience of the farmers here. However, it is better to see

something once than to hear something a hundred times. For this reason, the participants in the oblast agronomical seminar this time went to see the leading grain growers directly in the field.

The director of Voskhod A. S. Yermakov and the chief agronomist L. U. Koretskiy showed in real life what it means to have an individual approach to each field and to each crop. In all the brigades at the field camps there are concreted adjustment areas.

"Not a single cultivator or single drill goes to the field without coming here," emphasized L. U. Koretskiy. "And only agronomists do the adjustments."

The planting time in the virgin lands is in full swing. Now the farms have better readied the machine-tractor fleet than in previous years. Combined with the collective contract which has been adopted by a majority of the field brigades, this has significantly accelerated the pace of the work. But there are sovkhozes and kolkhozes which must hurry. For example, the farms in Krasno-armeyskiy, Volodarskiy and Chkalovski Rayons in Kokchetav Oblast from the very outset fell behind the schedule and if the pace is not picked up can miss the best planting times. Responsibility for this should be felt not only by the grain growers but also by the partners. Some of them have not been up to snuff. For instance, on the Tolbukhinskiy Sovkhoz at the very start of the planting work three tractor engines failed which had been repaired by the Tainchinskiy Repair Plant of Goskomsel'khoztekhnika. During the very first days of the planting season much poor workmanship was found in the work of the repairmen from the Atbasar and Kyzyltu Repair Plants.

Could such problems have been avoided? An affirmative answer to this question has been given by one of the partners of the farmers, the collective of the Borovskoy Rayon Sel'khoztekhnika in Kustanay Oblast. The workers from this enterprise organized seven specialized brigades at the maintenance station for the Kirov tractors. If a powerful tractor failed at any time, the brigade without delay headed to the farm and eliminated the malfunction. The nature of the breakdown did not intimidate the repairmen. Under field conditions they could quickly replace even a piston assembly and repair the transmission. The station's collective receives bonuses not for the number of repairs but for the condition of the tractors on the farms.

Incidentally, at the shops of the Borovskoy Sel'khoztekhnika they have begun re-equipping the KamAZ quarry dump trucks for loading the drills. We feel this discovery should interest the Sel'khoztekhnika workers in other rayons and oblasts.

Unfortunately, the quality of the field work is not flawless everywhere. In Shcherbaktinskiy, Pavlodarskiy and Bayanaul'skiy Rayons of Pavlodar Oblast, where little fall plowing was done since autumn, many farms have fallen behind in the spring plowing and over a significant area have used a moldboard plow which is categorically contraindicated in this erosion-prone and acutely arid zone. As on Stepnogorskiy Sovkhoz in Tselinograd Oblast they have begun planting on fields overgrown with sedge and wheat grass without carrying out any pre-sowing cultivation.

The farmers of Northern Kazakhstan have long and rightly complained of the shortage of mineral fertilizers. At the same time, what is available is not used properly everywhere. As before, a large amount of precious compound fertilizers is applied not in the drill rows with the seed but is scattered. Certain agronomists here do not even look at the soil charts, scattering the fertilizer wherever it is easiest. In the autumn such "technologists of the fields" will again blame the weather or envy their more fortunate neighbors. Even now one can see those who will most probably be successful. From the carefulness and strictness in their work on the spring field....

10272

CSO: 1824/474

MAJOR CROP PROGRESS AND WEATHER REPORTING

COTTON CROP PROGRESS IN TURKMEN SSR

Moscow SEL'SKAYA ZHIZN' in Russian 7 Jan 84 p 2

[Article by S. Kim, Turkmen SSR: "That Which Has Been Achieved Is Not the Limit"]

[Excerpts] The farmers of Turkmeniya have fulfilled their socialist obligations by selling the state 1,231,000 tons of cotton in 1983, including 326,000 tons of especially valuable fine fiber varieties.

As we know, last year was an unfavorable one for cultivating cotton. But despite this the majority of rayons and enterprises in the republic not only fulfilled plans and obligations but actually significantly surpassed them.

The cotton plantations of enterprises in Oktyabr'skiy Rayon are located in the northern part of the republic, where the sum total of favorable temperatures is significantly lower. Nevertheless, for many years in a row they have achieved large harvests of cotton and they are first in completing its harvesting and sale to the state.

This type of stability in results is not accidental. It is developed by means of the high professional mastery of cotton farmers, by the firm labor discipline within collectives and by the purposeful work of all partners in the agro-industrial complex.

The authority of the RAPO [Rayon Agricultural Production Association] soviet is very great in the rayon. Thanks to the constant attention and practical help of the party raykom and rayon executive committee, it was able to organize harmonious work among all links in the agro-industrial association in a short time. Now supplementary wages and the bonuses of partners depend not only on their fulfillment of their own plans, but also to a large degree on how this was reflected in the productivity of the hectare of cotton.

Further improvements in the system of planning and in the mechanism of economic management, the use of cost accounting principles of labor organization in production collectives, including collective contracts--all of this enabled the majority of enterprises in the republic to implement all agrotechnical measures precisely and in an organized manner, to raise a good harvest and to harvest it on time and without losses. Tashauz, Chardzhou and Ashkhabad

oblasts, 24 rayons and hundreds of enterprises fulfilled their obligations successfully and sold the state tens of thousands of tons of cotton raw materials beyond the quota.

The time has come to summarize results and to analyze them in order to carry all that is valuable into the future. Mastering progressive production technology and the most progressive forms of labor means above all decisively eliminating those mistakes and errors which hinder the development of the branch.

In 1983 in Mary Oblast there were many enterprises which undersupplied the state by tens of thousands of tons of cotton raw materials. A significant portion of that above-plan production which was obtained through the selfless labor of leading cotton raising collectives in the republic was actually used to cover this debt.

There are many reasons for the lags of some rayons and enterprises in the republic. Party organizations and RAPO soviets are studying them and taking all measures possible to make sure that they are not repeated in the future.

The republic's cotton farmers fervently approve the decisions of the December plenum of the CPSU Central Committee and are taking measures to implement them in practical terms. On fields soil is being prepared for future crops. In Tashauz Oblast, which was first in the republic to fulfill obligations related to the sale of cotton raw materials, over 80,000 hectares have already been plowed with two-tiered plows and organic and mineral fertilizers have been applied.

The republic's field workers are doing everything possible to make sure that in the coming year the cotton harvest is better and more weighty than before.

8228

CSO: 1824/486

MAJOR CROP PROGRESS AND WEATHER REPORTING

LARGE COTTON YIELD PLANNED

Ashkhabad TURKMENSKAYA ISKRA in Russian 8 Apr 84 p 1

[Article: "Path Towards Large Harvests"]

[Text] An increase in the procurement of cotton in the republic will be facilitated by the introduction into production of promising varieties of cotton. The sowing of this valuable crop has been started by the machine operators of the southern regions, including the enterprises of the Amudar'ye valley, where this year the newly regionalized varieties S-2606 and Oktyabr'-60 will undergo extensive production testing on crop-rotation fields. Last year these varieties proved themselves well as high-yield, disease resistant varieties producing up to 50 quintals of raw materials per hectare.

In the fields of the enterprises of the Tashauz agricultural industry association promising varieties such as Kzylravat, Tashauz-61, S-4727, An-Bayaut-2 and others will appear this spring. The extensive selection of varieties will enable us single out the plants that are most resistant to local conditions, with the best output of fiber and other valuable qualities.

At the present time in the republic there are over 20 elite seed farming enterprises. One third of them are specialized for the production of seed of the high-yield, fine-fiber Ash-25 variety with a filament of the first type. Developed by Turkmen specialists, it proved itself well in the fields of the Murgaba Valley and in the zone of the Karakum canal and the Khauzkhanskaya virgin lands.

Today it is planned to sow cotton on over 500,000 hectares in the republic, which is more than last year.

8228

CSO: 1824/486

MAJOR CROP PROGRESS AND WEATHER REPORTING

INDUSTRIAL TECHNOLOGY USED IN FIELD WORK

Moscow SEL'SKAYA ZHIZN' in Russian 7 May 84 p 1

[Article by S. Kim, Turkmen SSR: "Using the Industrial Method"]

[Excerpts] In Karakum spring always brings some surprises, but it has been a long time since there has been a spring like the present one. Coming about 1 month late and forcing many operations to be fulfilled simultaneously, it interfered with the previous plans of farmers. Circumstances required the regrouping of technology and people on the run in order to secure maximal mobility and organization and to complete work in the proper manner and in the best time. It must be said that in the majority of enterprises in the republic this difficult problem is being dealt with with honor. Many of them were able to lay the foundation for the future harvest in 10-12 work days.

In Ashkhabad Oblast, for example, an effective system, flexible and efficient, was developed to manage the sowing period. At its basis is a single coordinated center with dispatcher services. It not only oversees the course and quality of field work, but can also redistribute material-technical resources available to farms and enterprises of the agricultural industry if necessary. This type of concentration of all production potential in one pair of hands enables us to deal with many problems more quickly.

The kolkhozes and sovkhoses of Kirovskiy Rayon, as in the oblast as a whole, are counting on industrial technology in the production of cotton. During the first days of sowing they experienced difficulties in fulfilling one of the most important aspects of industrial cotton farming--measures to eliminate weeds--due to the shortage of necessary equipment. During a regular planning meeting on selector ties the rayon's directors turned for help to the coordination center. The problem was solved positively through the efforts of the associations of Sel'khoztekhnika [Agricultural Equipment Association] and Sel'khozkhimiya [Agricultural Chemical Association]. As a result of this, the Teze El and imeni Karl Marx kolkhozes, the Sovkhoz imeni Kalinin and other enterprises were able to use subsoil plows to plow up over 6,000 hectares heavily infested with rush to a depth of 50-60 centimeters with the simultaneous application of herbicides. The remaining 11,200 hectares were chemically treated for weeds during the sowing of seed.

We can cite many instances in which coordination centers have facilitated the quality fulfillment of field work and the highly efficient use of technology by means of their efficient participation. For example, the farmers of Kaakhkinskiy and Bakhardenskiy rayons were the first in the oblast to report completion of sowing of cotton, alfalfa, corn for grain and other spring crops. The management system has become more effective and it has enabled us to merge RAPO partners into a single production organism. Everyone is working for the final results not out of fear but because of his conscience.

The renewal of varieties is important for the development of industrial cotton farming in the republic. According to the calculations of scientists, the use of more disease-resistant, rapidly maturing varieties that adapt well to machine harvesting will enable farmers to produce an additional 3-5 quintals of cotton per hectare. In the Serakh Kolkhoz imeni Sverdlov a new variety of fine fiber cotton of first type 8771-I is being cultivated for the first time. It was also used to sow fields in many enterprises of the Murgaba Valley.

Basically, cotton farmers have completed sowing. On hundreds of thousands of hectares even shoots have appeared. Ashkhabad and Mary farmers have begun thinning and the first cultivation. At the same time in the Tashauzskiy Oasis sowing has lagged somewhat. This type of time gap is another surprise of this year's weather, which even now is not spoiling farmers. But despite everything, the republic's farmers are carrying out field work according to the indicated plan and doing everything possible to give the country 1,241,000 tons of cotton raw materials in the fall, including over 320,000 tons of the most valuable silky varieties with fiber of the highest quality.

8228

CSO: 1824/486

MAJOR CROP PROGRESS AND WEATHER REPORTING

SPRING SOWING OF COTTON IN TURKMEN SSR

Moscow TRUD in Russian 8 May 84 p 1

[Article by O. Kvyatkovskiy, Turkmen SSR: "Cotton Will Be Silky"]

[Excerpts] Mass sowing of cotton is taking place in the Turkmen SSR. The basic agricultural crop of the republic will occupy over 500,000 hectares---significantly more than in past years.

Spring took longer than usual to arrive in the foothills of the Kopetdag. The republic's summary of operations looks unusual. Next to recognized masters of cotton farming in Serakhskiy and Kaakhkinskiy rayons we have farmers from Kirovsk and Bakharden, who previously were not counted among the leaders, achieving the pace and the quality of sowing.

Arriving in this region not for the first time, I was quite aware of the changes in the very psychology of Kirov cotton farmers. Yes, the soil is difficult here; it is thickly covered even in July with a non-melting "snow"--salt. In the past some tried to justify their failures by means of this. But this spring Kirov farmers are not complaining about the soil--they are "treating" it persistently and skilfully and are introducing into practice those agrotechnical methods which they previously shied away from.

It is no accident that the Sovkhoz imeni Kalinin, one of the most difficult enterprises in the rayon, remains the leader. The party raykom together with the RAPO examined circumstances in detail. A special meeting of villagers was conducted by the first secretary of the raykom, B. Redzhepov. For the first time in many years technology was readied and plowing was completed on schedule. The RAPO soviet efficiently sent subsoil plows to the sovkhoz; 770 hectares of saline lands were plowed and double last year's amount of fertilizer was taken into the fields.

The people began to believe in themselves, and this was evident immediately in the results and in the organization of matters. Kirov farmers are carrying out sowing operations using the progressive wide-row method on intact crests of irrigation furrows. This is neater and faster. Mechanized complexes attached to groups of cotton farming brigades are operating actively.

The Ashkhabad Oblast trade union council passed a special program of trade union concern for sowing operations. Now all cotton sowing brigades have cozy field camps readied for spring and the feeding of farmers who work in the fields from dawn to dusk has been organized.

But not everything is going smoothly; the summaries of operations reveal a great variability in results. For example, whereas the daily increase in sown area comprises 15 percent in Serakhskiy Rayon, in Bayram-Aliyskiy and Karakumskiy it is lower by a factor of 2-3. The farmers of Mary Oblast are lagging behind noticeably. It would seem that they did not learn last year's lessons. Republic organizations are receiving signals about mass idleness of technology and about shortcomings in cultural-personal services for machine operators.

Seed is being placed into the ground. The Turkmen SSR has begun the struggle for a large cotton harvest--this year it is planned to sell the state 1,241,000 tons of raw material, including over 320,000 tons of the most valuable fine fiber varieties.

8228

CSO: 1824/486

MAJOR CROP PROGRESS AND WEATHER REPORTING

BRIEFS

MOISTURE RETENTION OPERATIONS--Lipetsk, 4 Jun--It is a busy period out on the oblast's beet and corn fields. Mechanized teams are waging a tense campaign aimed at retaining the moisture in the soil. Top hoeing, or so-called "dry irrigation," the destruction of weeds, thinning out of the seedlings and strict observance of the technological discipline -- these are all factors which exert a favorable influence on the condition of the crops. /by K. Alekseyev/ /Excerpt/ /Moscow SEL'SKAYA ZHIZN' in Russian 5 Jun 84 p 1/ 7026

GRAIN CROP SMUT DISEASES--Regional conferences on combating smut diseases in grain crops were held at Lipetsk and Ulyanovsk on the eve of the spring field operations. Specialists attached to the Rossel'khozkhimiya Association, scientific institutes and oblast plant protection stations discussed the problems concerned with organizing the chemical disinfection of seed and they outlined measures for reducing the degree of smut infection. /Text/ [COPYRIGHT: Izdatel'stvo "Kolos", "Zashchita Rasteniy", 1984] 7026

AIRBORNE TOP DRESSING--Kuybyshev--Crews of the Privolzhskiy Civil Aviation Administration have completed their work of applying a top dressing to the perennial grasses. This agricultural method makes it possible to raise considerably the cropping power of the meadows and pastures. This year the Kuybyshev aviators treated more than 200,000 hectares of land occupied by grasses -- almost one quarter more than last season. /Text/ /Moscow IZVESTIYA in Russian 19 May 84 p 1/ 7026

SPRING FIELD WORK--Field work is being carried out at a maximum tempo in the country's central-chnozem region. The region's farmers have made thorough preparations for spring and have taken into account the complicated weather conditions. The chairman of the Lipetsk Oblast People's Control Committee Ye. Vasil'chikov discussed the peculiarities of this present busy period and also the work being performed by the patrols during this busy period: "The atmosphere out on the fields this year is very business-like. It is important for the seed to be thoroughly prepared. Compared to last year, we have 20 percent more 1st class seed. The applications of organic fertilizer to the fields have been increased by one and a half times. The city-dwellers will be better supplied with early vegetables. The farms of the Lipetskplodoovoshchkhov Association are expanding to a substantial degree their assortment of products. There will be more onions, dill, celery and radishes. With regard to cabbage, the seedlings are being planted at different times and this will serve to

guarantee uniform harvesting of the heads commencing in mid-summer and continuing right up until late autumn. The patrols are devoting a great amount of attention to the problems concerned with observing the agricultural practices, proper order and achieving economies in the use of fuel and lubricating materials during the agricultural operations. For example, last spring a mass check was carried out on the use of fuel. Roughly 1,200 individuals participated in the inspection teams. Many shortcomings were uncovered at that time. The over-expenditure of gasoline amounted to 2,440 tons. In December we repeated this check and only recently we organized still another one. The measures adopted based upon patrol materials have made it possible to reduce noticeably the excessive burning of fuel and even to realize economies in its consumption. At the present time, the speedometers on many machines have been repaired, measures have been taken to reduce empty runs and strict accounting procedures have been organized at the refueling points and stations. And we are publicizing the experience of the more thrifty units and individuals in special leaflets entitled "For Effective Checks." Recently the patrols, jointly with GAI /state automobile inspection/ workers, specialists attached to the oblast's petroleum products administration and members of the Komsomol carried out checks on 62 sovkhoses, kolkhoses and subunits of Sel'khoztekhnika and Sel'khozkhimiya. The results of the inspection were summarized and publicized. There is presently a vast concentration of equipment on the oblast's rural roads and out on the fields. And our task consists of ensuring that it is operated in an efficient and thrifty manner. /by PRAVDA correspondents D. Zhnyukas and A. Starukhin/ /Text/ /Moscow PRAVDA in Russian 19 Apr 84 p 3/ 7026

WHEAT SOWINGS INCREASED--Ulyanovsk, 29 Apr--Spring wheat has always been the principal food crop of the central Volga region. Each year, many kolkhoses and sovkhoses in Ulyanovsk Oblast obtain high yields from this crop. For example, last year the farms in Sengileyevskiy, Starokulatkinskiy, Staromaynskiy and Tsilninskiy rayons obtained an average of 25-30 quintals of strong durum wheat grain per hectare. In view of the tremendous value of this crop, the oblast's kolkhoses and sovkhoses are expanding its sowings this year to 226,000 hectares, or 43,000 more hectares than last year. This year the Bezenchukskaya-139 durum wheat strain alone will occupy 42,000 hectares, or greater by a factor of three than the figure for 1983. The sowings of the Kutulukskaya variety, which produces high yields of 1st class grain in the Central Volga region, are being expanded considerably. In some rayons -- Surskiy, Terengulskiy, Karsunskiy and Tsilninskiy -- the spring wheat sowings are being expanded by 3,500-7,000 hectares. Over the entire area, the spring wheat is being sown simultaneously with granulated mineral fertilizer being applied to the rows. /by M. Belousov/ /Text/ /Moscow SEL'SKAYA ZHIZN' in Russian 30 Apr 84 p 3/ 7026

SOWING COMPLETED--Penza, 1 May--The sowing units are departing the fields. One after another, the oblast's rayons are completing their sowing of early spring crops. This work was carried out in an organized manner by the farmers in Tamalinskiy Rayon, who this year are striving to obtain 23 quintals of grain and 200 quintals of sugar beets per hectare. On the plantations of the Zavety Il'icha and Pobeda kolkhoses and on other farms, the beet growers have commenced tending their crops. /by A. Andreyev/ /Text/ /Moscow SEL'SKAYA ZHIZN' in Russian 2 May 84 p 1/ 7026

EARLY RIPENING CORN HYBRIDS--Penza, 22 May--Seedlings have appeared on the grain fields and sugar beet plantations and yet the sowing work is continuing. Potatoes are being planted and hemp and vegetable crops are being sown. A day or two ago the corn growers commenced their sowing work. This year the main silage crop will occupy one quarter of a million hectares. On almost this entire area, it will be tended by teams which work on the basis of a collective contract. For the purpose of increasing the forage resources for public animal husbandry, corn will be grown for grain on tens of thousands of hectares. Towards this end, the oblast has procured seed for early ripening hybrids. This seed will be sown first of all. /by A. Andreyev/ /Text/ /Moscow SEL'SKAYA ZHIZN' in Russian 23 May 84 p 1/ 7026

HIGH QUALITY OPERATIONS--The field work is advancing further and further to the east. The farms in the nonchernozem zone are completing their mass sowing operations. The existing logistical potential and the weather conditions are making it possible to carry out all work rapidly and in a high quality manner. The rayon associations of Sel'khoztekhnik in Ryazan Oblast are providing the farms with a great amount of assistance. /Excerpt/ /Moscow TRUD in Russian 19 May 84 p 1/ 7026

LEADING RAYON--Ryazanskiy Rayon is a leading rayon not only in terms of spring field work but also in the production of all types of agricultural products. And this is largely the result of work performed by workers and engineers attached to Sel'khoztekhnik, which provides a reliable rear services operation for the agricultural workers. /by Z. Sorokina, chairman of the Ryazan Oblast Committee of the Professional Trade Union for Agricultural Workers/ /Excerpt/ /Moscow TRUD in Russian 19 May 84 p 1/ 7026

COLLECTIVE CONTRACT METHOD--Concentration and an elevated mood are typical features of this present period of spring field work. Brigades and teams operating in accordance with the collective contract method can be found in all of the oblast's rayons. In all, there are more than 700 of them out on the Ryazan fields and they are working 80 percent of the arable land on a contractual basis. The contractual collectives underwent training on the eve of the sowing work -- at special seminars, they studied the experience accumulated in obtaining high grain and forage crop yields, in introducing use of the industrial technology for the cultivation of sugar beets and potatoes and in making the best use of equipment. Many have profited from the knowledge obtained. Overall, the brigade headed by N.I. Smolyakov at the Novaya Zhizn' Kolkhoz in Morablinskiy Rayon required only 70 hours in order to sow spring grain crops on 1,500 hectares. "We completed this work 20 hours earlier than the time called for in the plan" stated Nikolay Ivanovich, "We thus saved an entire spring day, which as is well known is sufficient for providing feed for a year." Many such examples are to be found in Pronskiy, Skopinskiy, Miloslavskiy, Mikhaylovskiy and a number of other rayons. And many farms have already completed sowing their early spring crops. This year the rates and quality of the field work, for the oblast as a whole, are considerably higher than those for last year. /by A. Zholobov/ /Excerpt/ /Moscow SEL'SKAYA ZHIZN' in Russian 22 May 84 p 1/ 7026

HIGH WORK TEMPO--Ivanovo, 24 May--Despite having commenced sowing their grain crops considerably later than 1 year ago, owing to the weather conditions, the oblast's farmers nevertheless succeeded in completing this campaign earlier than usual and during the best agrotechnical periods. This success was ensured by the fact that this year the majority of the machine operators are working on the basis of a collective contract, they are making better use of

their equipment and they are introducing new work methods into operations. The grain growers in Gavrilovo-Posadskiy, Komsomolskiy, Ivanovskiy and Yuzhniy rayons, where the rates for the field work exceed the norm by a factor of 1.5-2, were the first in the oblast to sow their spring crops. /by B. Svishchev/ /Text/ /Moscow SEL'SKAYA ZHIZN' in Russian 25 May 84 p 1/ 7026

GRAIN CROP SOWINGS COMPLETED--Kazan, 23 May--The land reclamation specialists in the Tatar ASSR countered the hot dry weather with efficiently organized watering operations. The man-made rainfall is watering the fields in Drozhzhanovskiy Rayon around-the-clock. The second watering of the pastures and haying fields has already been started here. Cost accounting brigades and teams are performing successfully in Menzelinskiy Rayon. Thus, in addition to irrigation at the Menzelinskiy Sovkhoz and the Gigant Kolkhoz, the teams of G. Markov and Kh. Galimov are applying a liquid top dressing to the plantings, thereby ensuring the programmed yield for the forage crops. Artificial rainfall is being applied continuously to the long-standing cultivated pastures of many kolkhozes and sovkhoses in Kukmorskiy, Baltasinskiy, Alekseyevskiy, Tetyushskiy and other rayons. /by V. Goncharov/ /Text/ /Moscow SEL'SKAYA ZHIZN' in Russian 24 May 84 p 1/ 7026

LABOR PRODUCTIVITY RAISED--Perm--The non-schedule teams which undertook to carry out two thirds of the sowing work on the spring crop fields in the Prekam'ye region passed their test in an outstanding manner. The sowing of grain crops has been completed in the oblast -- wheat, oats and barley. Compared to last year, labor productivity in the non-schedule teams has been raised by 20-25 percent. This helped the grain growers to complete their sowing work during the best periods, despite the late commencement of the sowing work. /Text/ /Moscow SOVETSKAYA ROSSIYA in Russian 3 Jun 84 p 1/ 7026

CULTIVATION OF SHOOTS--In the Kolkhoz imeni Dimitrov, the Kolkhoz imeni Tel'man and the Vatan Kolkhoz of Vekil'-Bazarskiy Rayon the rows are showing up clearly on fields which were planted early. Machine operators have moved the first cultivators into the interrows. Tractors that have completed sowing are being attached to cultivators in other kolkhozes of the region as well. Warm weather, good soil preparation and high quality sowing facilitate the appearance of even shoots. Cultivation is begun without hesitation, which will facilitate the early completion of the entire complex of care for cotton crops. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 18 Apr 84 p 1] 8228

COTTON SHOOTS DEVELOPING--In the enterprises of Ashkhabad Oblast the rows have turned green on over two-thirds of the crop area. In Bakhardenskiy Rayon cotton has developed shoots on its entire sowing area, in Serakhskiy Rayon--on 88 percent of the area. In the kolkhozes and sovkhoses of Mary Oblast cotton has developed shoots on 42 percent of its area. In the region of the central course of the Amudar'ye rows have turned green on almost one-fourth of the sown area. The largest number of shoots are to be found in Sayatskiy Rayon--on 46 percent of the area, in Dostlukskiy Rayon--41 and Khalachskiy--one-third of the area. The first green shoots have appeared on early sowing fields in Tashauzskiy Rayon. In the republic as a whole shoots have appeared on 166,700 hectares or 38.5 percent of the area in crops. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 24 Apr 84 p 1] 8228

LATE SPRING--This year spring is not spoiling farmers in Leninskiy Rayon. It is the second half of April and there have not been many sunny days. Warm weather has begun in the last few days. The time for sowing is passing; we must hurry. [V. Karpov, P. Medvedev] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 24 Apr 84 p 1] 8228

CULTIVATION OF PLANTATIONS--The cultivation of plantations has begun by farmers of Takhta-Bazarskiy Rayon, the first in Mary Oblast to complete the sowing of the basic crop. The machine operators of the Kolkhoz imeni Kirov and the Kolkhoz imeni 22 S'yezda KPSS were first to bring their cultivators into the fields. On large areas seed was placed into well-prepared soil, enabling farmers to produce even shoots. Shoots have appeared on most of the area. In many kolkhozes and sovkhoses of the oblast cultivation has begun. [Turkmeninform] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 25 Apr 84 p 1] 8228

SOWING PACE INCREASING--In April the republic's sovkhoses and kolkhozes sowed 17,000 hectares in cotton. As before the greatest sowing pace occurred in Serakhskiy Rayon. Daily growth here comprised 14.6 percent; in Bakhardenskiy Rayon--11.5 percent and in Kaakhkinskiy--10.8 percent. The pace of sowing operations is much slower in Mary Oblast. The highest daily growth in the oblast was achieved by Takhta-Bazarskiy and Sakar-Chaginskiy rayons--5.9 percent. At the same time in Bayram-Aliyskiy Rayon this indicator was 1.8 percent, in Karakumskiy Rayon--2.6 and in Turkmen-Kalinskiy--2.7. In the oblast as a whole the sowing plan was fulfilled by 11.9 percent. The cotton farmers of Chardzhou Oblast are increasing their pace. Thus, in Dostlukskiy Rayon daily growth exceeds 5 percent; in Sayatskiy and Charshanginskiy rayons--3.9 percent. One-third of the area has been sown in fine-fiber cotton in the kolkhozes and sovkhoses of Ashkhabad and Mary oblasts. Ahead is Bakhardenskiy Rayon, which has sown nine-tenths of the allocated area. The plan has been fulfilled by 70 percent by the enterprises of Kaakhkinskiy Rayon, by 64 percent--Kirovskiy Rayon and 51 percent--Takhta-Bazarskiy Rayon. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 8 Apr 84 p 1] 8228

RAPID PACED COTTON SOWING--The farmers of Ashkhabad Oblast are proceeding with field work at a rapid pace. Daily growth here comprises 7.4 percent. Two rayons--Bakhardenskiy and Kaakhkinskiy--have completed sowing. It is being completed by the cotton farmers of Serakhskiy Rayon as well. In Mary Oblast the leaders according to sowing pace are the cotton farmers of Takhta-Bazarskiy Rayon. The cotton farmers of Dostlukskiy and Charshanginskiy rayons have become the leaders in Chardzhou Oblast. Spring work is increasing in momentum in the Tashauz oasis. Here the best results are being achieved by the farmers of Kunya-Urgenchskiy and Kalininskiy rayons. However, the sowing pace this spring is much slower than last year's. The cotton farmers of Mary, Chardzhou and Tashauz oblasts especially must increase the organization of work and the effectiveness of competition. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 12 Apr 84 p 1] 8228

COTTON SOWING PACE--In comparison with the preceding day the pace of sowing of cotton has increased somewhat. Daily growth has reached 5.4 percent. Another rayon in Ashkhabad Oblast--Gyaurskiy--has reported about completing sowing. Sowing is taking place on the final hectares in Serakhskiy and Tedzhenskiy rayons. Daily growth in Mary Oblast is a little less than 8 percent, which is more than during the preceding day. As previously, the best

results here are being achieved by the cotton farmers of Takhta-Bazarskiy and Kushkinskiy rayons. They fulfilled the plan by 88.3 and 75 percent respectively. Daily growth doubled in Il'yalinskiy Rayon, reaching 13 percent. But in Vekil'-Bazarskiy and Bayram-Aliyskiy rayons the sowing pace decreased. The farmers of Dargan-Atinskiy, Tel'manskiy and Kalininskiy rayons gave up their positions. RAPO [Rayon Agricultural Production Association] soviets, especially of Chardzhou and Tashauz oblasts, should take immediate measures to pull up lagging enterprises and to secure the fulfillment of the sowing plan for cotton in the optimal period. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 13 Apr 84 p 1] 8228

IPATOV METHOD USED--The sowing pace for the basic agricultural crop in the Tashauz Oasis is increasing. Cotton farmers are working according to the Ipatov Method. In the oblast 290 mechanized sowing complexes have been created, which include about 7,000 plowing and furrow tractors, many sowers and other equipment. A drawn-out spring made the work of farmers more difficult, but cotton farmers are setting skill and rich experience against the caprices of nature. RAPO partners have come to the aid of cotton farmers. [Turkmeninform] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 12 Apr 84 p 1] 8228

PROGRESSIVE SOWING METHOD--The sowing of a specific number of seed will facilitate a decrease in labor expenditures, time and resources for thinning out cotton. Precise sowing units will now operate on 45,000 hectares. They have already moved into the fields of Vekil'-Bazarskiy and Karakumskiy rayons. In order to produce early shoots in many enterprises of Mary Oblast seed is placed into the soil on the crests of furrows. When sown in this manner they are warmed more rapidly and germinate better. [Turkmeninform] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 13 Apr 84 p 14] 8228

SOWING OF COTTON BEGINS--Ashkhabad--The sowing of cotton in the southern part of the republic was begun by the cotton farmers of the Turkmen SSR. The machine operators of the southern cotton sowing enterprises moved sowers into the fields harmoniously and in an organized manner. Their partners in the agricultural association--repair workers of subdivisions of Sel'khoztekhnika [Agricultural Equipment Association]--prepared sowing units, cultivators and other equipment with quality. [TASS] [Text] [Moscow TRUD in Russian 4 Apr 84 p 1] 8228

BARE SEED SOWN--The enterprises of Ashkhabad Oblast overfulfilled the quota for the sowing of cotton using bare seed. This seed was sown on 28,400 hectares as compared to the planned 20,000. [Ashkhabad TURKMENSKAYA ISKRA in Russian 18 Apr 84 p 1] 8228

SHOOTS APPEAR--In fields where cotton was sown early shoots have appeared. In the enterprises of Bakhardenskiy and Tedzhenskiy rayons they have appeared on one-fifth of the crop area. Rows have grown green on the first thousand hectares in the kolkhozes of the central course of the Amudar'ye. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 18 Apr 84 p 1] 8228

CSO: 1824/486

REGIONAL DEVELOPMENT

DEVELOPMENT OF KAZAKHSTAN VIRGIN LANDS DISCUSSED

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 2, Feb 84 pp 16-22

/Interview with A.I. Barayev, doctor of agricultural sciences, professor and scientific figure of the Kazakh SSR, by V. Gundarev and G. Terets; date and place not specified/

/Text/ VASKhNIL /All-Union Academy of Agricultural Sciences V.I. Lenin/ Academician A.I. Barayev has made a great and invaluable contribution towards the transformation of the previously barren expanses of Kazakhstan. Speaking before a ceremonial meeting devoted to the 25th anniversary of the virgin lands, member of the Politburo of the CPSU Central Committee and 1st secretary of the Central Committee of the Communist Party of Kazakhstan D.A. Kunayev noted: "The development of the virgin lands required improvements in the entire system of farming and the scientists successfully coped with this difficult task."

In this sense, the entire country is familiar with the fruitful results of the work performed by the All-Union Scientific-Research Institute of the Grain Economy at Shortandy, directed by Aleksandr Ivanovich Barayev."

Eminent scientist, Lenin Prize Laureate, Hero of Socialist Labor, deputy to the republic's Supreme Soviet, Doctor of Agricultural Sciences, professor and honored scientific figure of the Kazakh SSR. And there are still some other titles, some of which are unofficial. The newspaper PRAVDA has referred to him as the patriarch of scientists working in the virgin lands. And the Moscow writer and publicist Yuriy Chernichenko -- as the "chief agronomist of the virgin land."

It is impossible to imagine the Kazakhstan virgin land without Academician Barayev. Similarly, one cannot imagine Barayev without the virgin land. The soil-protective system of farming created by a collective of scientists under his direction accounts for its appearance and for the typical features of the republic's grain steppe regions today and it also accounts for the nature of the field production operations being carried out on the developed Kazakhstan lands. With each passing year, the soil-protective agricultural practices being employed in grain production are conquering larger areas of "vital space": non-plow tilling of the land is presently being employed throughout the country on almost 50 million hectares of sowing areas.

And how pleasant it must be for a scientist to see his ideas, his tireless research and his scientific developments become realities and receive general recognition.

We wish to bring to the attention of the readers a discussion held with the director of the All-Union Scientific-Research Institute of the Grain Economy A.I. Barayev, prepared specially for our journal by V. Gundarev and G. Terets.

/Question/ Aleksandr Ivanovich, we have noted that for many years a small cylinder of crystal clearness and purity and bearing the imprint of two truly life-like spikelets of wheat has stood on the desk in your office. We view this souvenir as a symbol of your studies and as a symbol of your loyalty to your work and of love for the Kazakhstan steppe fields. During our previous meetings, you repeatedly emphasized the fact that you considered yourself to be first of all an agronomist and a specialist in wheat. Is this not so?

/Answer/ Yes, this is true. All of my working life has been associated with the production of the country's principal food crop -- wheat, and my best and happiest years, although the most difficult ones, were devoted to the virgin lands, the problems of which I began to concern myself with literally with the first day of their development.

/Question/ You became a resident of Kazakhstan long before 1954. What influenced your selection in this regard?

/Answer/ Several years after completing a program of studies at the Kuybyshev Agricultural Institute, I became a scientific worker at the Bezenchuk Experimental Station. I was unusually lucky: the experimental station was under the direction of a well known scientist and highly respected expert in dry steppe farming, Nikolay Maksimovich Tulaykov. A wonderful individual, he has been and continues to be a model scientist for me, before whom I bow in respect. Academician Tulaykov has always been distinguished by boldness and courage in defending his convictions in behalf of scientific truth, regardless of the personal adversities which lay in his path. I learned and adopted a great deal from him. All of this proved very useful to me during the period devoted to finding effective measures for combating the wind erosion of soil.

Over a period of two and a half years, work at the Bezenchuk Experimental Station became for me a truly creative and practical school and it also determined my scientific profile -- steppe farming.

Obviously having taken note of my special attraction to agronomy and serious studies in this area, Nikolay Maksimovich recommended that I employ my knowledge in the sphere of possible farming -- at the Uralsk Experimental Station. I followed his advice and went to western Kazakhstan. Initially I served as a scientific worker and commencing in 1937 I became the deputy director of the experimental station for science and thereafter -- the director. In 1946, at the age of 38, I became a Candidate of Agricultural Sciences.

The work fascinated me. The climate was more harsh and more dry than in the Volga region and such problems as how to carry out farming operations and which crops to grow under such conditions were more complicated. Certainly, I

was aware that the urgent problems of field crop husbandry would not be solved quickly or easily in this extremely arid zone. Years of tense labor were required.

In May 1949 I was assigned to serve as the chief of the Administration for the Testing of Agricultural Crop Varieties of the USSR Ministry of Agriculture. But I must honestly admit that before long I felt that I was an agronomist for asphalt in the capital -- it was similar to Antey being cut off from the land. And I was irrepressibly drawn back to my native collective, in order to continue the work already begun: to convert the vast kray of possible farming into a zone of stable farming. And nevertheless it was impossible to launch operations in a comprehensive manner or on an extensive scale at a small experimental station. Thus, when in August of 1953 I was offered the post of head of the Kazakh Scientific-Research Institute of Farming, I accepted.

Question Was it at this time that you drew the conclusion that in Kazakhstan a drought is not a natural calamity, but rather a regular natural phenomenon, the conditions of which can and must permit the cultivation of grain?

Answer This is completely true. Our remarkable soil scientist V.V. Dokuchayev expressed it very well when he said: "Everything in nature is beautiful. All of these enemies of our agriculture: wind, drought conditions and dry winds are terrible to us only because we have not learned how to control them. They are not evil happenings, but rather they must be studied. We must learn how to control them such that they will work in our behalf." Thus we attempted to adjust to the local conditions. Responsible for the scientific work of the experimental station, I concerned myself with developing methods for combating droughts by means of snow retention, special agricultural practices, the development and introduction into operations of drought-resistant varieties of spring wheat and preparing recommendations for agricultural practices to be employed for the cultivation of perennial grasses for hay and seed and a method for seed production, which subsequently would prove useful for work on the virgin land.

The KIZ Kazakh Scientific Research Institute of Agriculture has at its disposal one experimental station and several support points in the northern part of the republic. The decision was made to increase and expand them, since a sharp increase had taken place in the volume of work and accurate recommendations were needed with regard to which tracts to plow, what crops to sow and so forth. We began organizing operations in the interest of improving the virgin lands. All-round brigades of scientists were sent out to the sovkhoses which had been created in the feather-grass and quite often uninhabited steppe regions. Tests and studies were carried out and it became increasingly clear that the cultivation of grain crops on millions of hectares of plowed land in zones of risky farming had to be carried out some other way. But how?

In order to answer this question, time was required. The country required a large amount of grain and immediately. The hopes rested on the virgin land and long fallow lands of Kazakhstan and Siberia. I traveled thousands of kilometers over the developed steppe region, visited a majority of the new sovkhoses and

took note of the enthusiasm with which the envoys of the party and komsomol laid out the first furrows among the stretches of feather-grass. As is known, during the first virgin land years the new lands were developed using the traditional methods: the fields were plowed using plows with mouldboards, they were tilled using stubble plow disk harrows and they were sown in grain crops during early periods, that is, use was made of the classical system used in the European part of the country, from whence hundreds of thousands of the new settlers had emanated.

Based upon the experimental data obtained and a summary of production experience, we expressed the firm conviction that farming in the virgin land must have its own system, one that is based upon the local soil-climatic conditions. And first of all it was necessary to reject the plow as the principal implement for tilling the soil.

/Question/ Do you mean to imply that it was necessary to oppose the basic principles of classical farming?

/Answer/ Precisely so. And there were impressive reasons for this. Indeed, under our conditions the traditional farming methods turned out to be not only ineffective but completely unsuitable and even harmful. The annual tilling of soil using plows with mouldboards, stubble plow disk harrows and spiketooth harrows, sowing work carried out using disk sowing machines and also packing of the soil promoted the rapid dispersion of the fertile layer of soil and the development of severe wind erosion.

The chronicle of the virgin lands contains dramatic pages. Chernozem dust storms have become a common phenomenon. And in 1962 the Kazakhstan steppe region was affected to the greatest degree by such storms. One and a half million hectares of arable virgin land were destroyed by wind erosion. During these years the greatest amount of wind erosion was inflicted upon the fields in Pavlodar Oblast.

Misfortune, as the saying goes, does not travel alone. Dust storms were not the only calamity which the virgin lands were subjected to. The unsystematic use of large plowed areas produced a situation wherein the tracts which survived erosion succumbed to the so-called "green fire" -- wild oats and sowthistle weeds literally dislodged the wheat from the arable land. And to a large degree this was the result of the theory which prevailed at the time with regard to the early sowing of grain crops. Moreover, this also brought about a decrease in cropping power, since the plantings were fatally affected by the June drought, a common happening under our conditions.

For example, let us take Tselinograd Oblast. Compared to the 1956-1960 period when the adverse effects of classical farming in the virgin lands had not yet manifested themselves fully and the average annual cropping power for grain crops throughout the oblast as a whole amounted to 9.3 quintals per hectare, during the next five-year period, when the chernozem dust storms and the "green fire" were at their worst, the average cropping power fell by more than 3 quintals. Thus a firm barrier must be erected against wind erosion and the "green fire."

/Question/ As early as 1955, the honored Academician of VASKhNIL /All-Union Academy of Agricultural Sciences imeni V.I. Lenin/ wrote: "The only argument centers around the easiest and quickest method for breaking up the sod -- the principal value of the virgin and long fallow lands -- that is, how to remove the cream from the milk more completely. And conversely, we should not look for the means for ensuring that no reduction takes place in the fertility of the virgin and long fallow lands, but rather we should systematically multiply and intensify this fertility." Is this not true?

/Answer/ Yes, we attempted to find such means and new methods for tilling the soil. In 1957 the Kazakh Institute of the Grain Economy was created at the Shortandy Experimental Station and subsequently it became the All-Union Scientific Research Institute of the Grain Economy.

We take pride in the fact that during those years we worked with the well known Kazakhstan plant breeder and student of Vavilov -- Valentiyy Petrovich Kuz'min -- who subsequently became an academician of VASKhNIL, an academician of the Academy of Sciences for the Kazakh SSR and a Hero of Socialist Labor.

The experimental farm, which occupies a sowing area of several tens of thousands of hectares, was turned over to the new institute. The chief task of the scientific collective of the institute, which I was assigned to direct: taking into account the peculiarities of the soil cover and climate, to create an effective system for farming. In the development of this program, priority attention was given to the following tasks: eliminate wind erosion, reduce to the maximum possible degree the destructive effect of drought conditions on plant development and at the same time establish a reliable foundation for obtaining stable yields.

Among the many elements to be used in forming this system, a requirement existed first of all for defining the chief one -- the method to be used for tilling the soil. We were convinced that the plow was not suitable for use in the virgin lands -- it was viewed as being the chief "culprit" with regard to the wind erosion taking place over vast plowed areas. The conclusion was drawn that a field is capable of protecting itself against chernozem dust storms if it is not plowed and if the stubble is allowed to remain. Its light "armor" can provide reliable protection against wind erosion. We attempted to use the non-mouldboard method proposed by T.S. Mal'tsev. However, the proper results were not obtained, since the stubble background was also unfortunately destroyed when use was made of the non-mouldboard method.

Basically new soil cultivation implements were needed. As a result of collective efforts, sweeps, deep rippers, stubble field sowing machines, needle shaped harrows and other machines, none of which existed earlier in domestic farming practice, were created.

The sweep method became a basically new trend in the theory and practice of soil cultivation.

Thus gradually the virgin land soil-protective system of farming began to be created step by step. Today its principal elements include: grain-fallow crop rotation plans with a brief rotation, a system of sweep soil cultivation,

snow retention, optimum sowing periods, applications of phosphorus fertilizers, reduced sowing norms, deep placement of the seed in the soil, strip arrangement for fallow, soil-protective crop rotation plans on light textured soils, planting of windbreak strips on fallow fields, moisture retention work by needle-shaped harrows, sowing carried out using sowing machine-cultivators and the use of herbicides for combating weeds.

/Question/ The new agricultural practices have been recommended for use. The fields of our institute's experimental farm have convincingly demonstrated the effectiveness of the soil-protective system of farming. Yet with its introduction into operations on an extensive scale, the work is still not proceeding either simply nor smoothly. Is this not true?

/Answer/ Initially there were many objections and literally with regard to each element of the new system. Yes and this is quite understandable. Indeed, in order to "retire" the plow and no longer use it for cultivating the soil or turning over a bed, it was necessary first of all to convince not only the grain growers but also the scientists and economists of the need for doing so. And this was equally as complicated as creating a basically new agricultural system.

For example, let us look at the optimum sowing periods. We drew a firm conclusion: the sowing should be carried out not as early as possible but roughly from 15 to 25 May. But the periods recommended were in conflict with the existing arrangements and the scientific recommendations. What arguments could we use?

First of all, having provoked the pre-sowing cultivation of wild oats, it was necessary to wait and give it an opportunity to sprout and later destroy it before commencing the sowing operations. Secondly, these periods assist the grain crop seedlings in escaping the drought conditions which usually occur in northern Kazakhstan in June. And the art of a grain grower consists of bringing the formation of an ear of wheat precisely to the period of late July precipitation. The recommended tactic promoted the development of stable yields even during years marked by unfavorable weather conditions.

Clean fallow is recognized as being an indispensable element in crop rotation plans having a brief rotation. And forage crops -- perennial and annual grasses -- must occupy a definite place on a farm. Generally speaking, we are convinced that each agricultural method for cultivating a field must be soil-protective in nature, as so also should be the overall system. However, at the same time as the war against "grass users" began, the campaign to do away with clean fallow was launched. There was but one argument: "The land must not lie idle." We had proven that the moisture supplies are increased on fallow fields and this is of decisive importance given the local arid conditions. With proper cultivation of the fallow, considerable supplies of nutrients accumulate in the soil, perennial weeds are removed from the fields and sharp reductions take place in the supplies of live seed for annual weeds and in the numbers of harmful insects. In addition a decrease takes place in the degree to which wheat plants are infected by root rot. And these were not theoretical conclusions; we used specific facts and figures: the harvest obtained following clean fallow on the fields of our institute's experimental farm was always higher than that obtained following other predecessor arrangements.

/Question/ Thus, can it finally be said that truth triumphed?

/Answer/ Yes, clean fallow has truly become firmly established on the virgin land fields. However, it sometimes happens that the trend towards reducing the amount of clean fallow gains the upper hand in some areas. But to sow more does not necessarily mean that more will be harvested. Simple arithmetic allows us to state that fallow presents us with the only opportunity to sow less and to obtain more grain.

/Question/ Aleksandr Ivanovich, during the period mentioned above, the recommendations by your scientific collective were supported by many far-seeing and thoughtful grain growers. How were you able to convince them that the classical system of farming was not suitable for the virgin lands and the soil must be tilled using another technology?

/Answer/ The grain was our chief argument. The rampaging dust storms which caused tremendous damage in all areas by-passed the tracts of the experimental farm, which were cultivated using the new system, with sweeps and with retention of stubble. Neighboring farms became the first to adopt the new technology. This included the Kolkhoz 18 Let Kazakhstana, which was headed by Hero of Socialist Labor Kan De Khan. Delegations came to us from other rayons and oblasts of northern Kazakhstan.

The figures for those years were quite significant. In 1961 the institute's opkhoz /experimental farm/ obtained an average of 11.8 quintals of grain from each hectare and Tselinograd Oblast -- 6.5. For the following year the figures were 11.9 and 6.3 quintals respectively. During the extremely dry year of 1963, the experimental farm obtained an average of 8.1 quintals of grain and the oblast -- 3.3 quintals. During the productive year of 1964, the figures were 17.8 and 11.8 quintals respectively. But at this time not all of the elements of the soil-protective system had been fully worked out. But the new technology had already proven its vitality in a very convincing manner.

The party, soviet and agricultural organs of the republic and country began providing us with greater support. Finally the time of the historic March (1965) Plenum of the CPSU Central Committee arrived. This Plenum devoted a great amount of attention to the problem of grain production and supported the feasibility of the soil-protective system of farming.

In June 1965, during the 13th Plenum of the Central Committee of the republic's Communist Party, which discussed the results of the March Plenum, the 1st secretary of the Central Committee of the Communist Party of Kazakhstan Comrade D.A. Kunayev stated: "Today is already clear to all that without the introduction into production operations of the soil cultivation system recommended by the Institute of the Grain Economy, we would not be able to raise the productivity of farming in the virgin land regions or prevent wind erosion." Thus at this point the work had been placed on a broad practical basis. In 1966, a traveling session of VASKhNIL was held in Tselinograd. Here the great scientific value and national economic importance of the soil-protective system of farming developed by the institute was recognized.

/Question/ Two years later your institute was awarded the Order of the Red Banner of Labor. It would seem that at this point you would be satisfied and could rest content. Is this not so?

/Answer/ Only we could not rest content. The collective was assigned new and complicated tasks by VNIIZKh /All-Union Scientific Research Institute of Grain Farming/. We were required to participate in publicizing the system that had been created and its extensive introduction into operational practice. An important stage in this plan was the well known decree of the CPSU Central Committee and the USSR Council of Ministers entitled "On Urgent Measures for Combating Soil Erosion," adopted in 1966. Based upon our recommendation, a special design bureau was created in Tselinograd for developing models of anti-erosion machines, work commenced on the erection of the new Kazakhsel'mash Plant and modernization of the Tselinogradsel'mash Plant was carried out. A large base for the production of anti-erosion agricultural equipment appeared within a brief period of time. In short, all of this work was being carried out on the basis of it being of all-state importance.

In the work concerned with basically new implements for the virgin lands, the scientists of VNIIZKh combined the efforts of many institutes and design bureaus and this produced rapid and positive results. Literally, within a matter of 3 years and as a result of the measures undertaken, the kolkhozes and sovkhozes of the virgin lands were re-equipped -- an example that is completely unique in world practice.

The Tselinogradsel'mash Production Association is now the largest supplier of anti-erosion equipment not only for the fields of Kazakhstan but also for other regions of the country. With each passing year, its enterprises are increasing their production of new equipment. Nevertheless, the quantities of such equipment are still inadequate when one considers the increasing requirements for anti-erosion machines, in light of the expansion taking place throughout the country in sowing areas being cultivated using the soil-protective system of farming.

In the case of our republic, non-plow cultivation was introduced into operations on an extensive scale under the direction of the Central Committee of the Communist Party of Kazakhstan and this made it possible to protect the fertility of the soil on tens of millions of hectares of land and to raise considerably the gross yields of grain.

It is sufficient to state that the average annual production of grain in Kazakhstan, prior to the development of the virgin lands in 1949-1953, amounted to 3.9 million tons; following the plowing up of the virgin lands in 1961-1964 it increased to 14.5 million tons and following the introduction of the soil-protective agricultural methods during the 1976-1980 period, Kazakhstan raised the annual production of grain to 27.5 million tons. Thus, in terms of its grain production level and the quantity of grain turned over to the state, the republic took over 1st place throughout the country during the 10th Five-Year Plan, having increased grain production by 27 percent compared to the previous five-year plan.

/Question/ Aleksandr Ivanovich, non-plow cultivation of the soil has become the principal agricultural method for cultivating grain crops out on the fields in the Kazakhstan steppes. And the intricacies of the soil-protective technology, which have transformed this zone of risky farming into an area of guaranteed and stable grain yields even during very dry years, are today well known on each farm. Such masters of high yields, virgin land brigade leaders and heroes of socialist labor Mikhail Dovzhik, Nurgabul Malgazhdarov, Vladimir Dityuk, Zhuman Isabekov, Stanislav Gavriilyuk and many others, in addition to their personal selflessness and expertise, owe their fame to use of the soil-

protective agricultural method. They were some of the first to begin using this new and progressive technology and they are practical propagandists of this system. Does this mean that your recommendations must be followed in an accurate manner if large quantities of grain are to be obtained? Indeed, there are still many farms and brigades which unfortunately are unable to raise their cropping power. What is the problem?

/Answer/ The soil-climatic conditions found in the Kazakhstan virgin land differ greatly. The territory of Tselinograd Oblast alone appears as an entire complex of different soil-vegetation zones: to the north -- chernozem forest-steppe, to the south -- a vast sub-zone of dry steppes, which change into a semi-desert region. The grain crops are grown on a vast territory having an annual precipitation ranging from 200 to 300 millimeters. And obviously this is not suitable for Balkashinskiy or Krasnoznamenskiy rayons. Although the soil-protective system of farming takes into account more completely the local conditions, this does not necessarily imply that its arrangements and elements are unchangeable. They must constantly undergo further development and improvement, with specific factors necessarily being taken into account. Yes, the specific conditions of each locale must be taken into account. The work cannot be carried out based upon a stereotyped pattern. And at the same time in the virgin lands, no one element of the soil-protective system of farming should be neglected. It is only necessary to overlook one element and the system may fall apart, fail to perform as expected and produce adverse results. Everything is dependent upon the manner in which a particular agricultural method is employed. And here the grain growers must display a creative approach in carrying out their work. An individual approach is required for each field.

And if some of the farms or rayons fail to blame the low yields on their own neglect and mistakes or upon the fact that the soil-protective technology was not utilized in an intelligent manner or in full volume and thus the culture of farming was lowered, but rather they made references to the drought conditions, I would remind them in such instances that we live in the extremely arid steppe region, in the so-called zone of risky farming. Thus, every effort must be made first of all to learn how to obtain higher and more stable yields under any and all circumstances. Extremely dry years are not extraordinary events for us, but rather they represent common and natural conditions in this particular zone. If we are discussing the scientific management of agriculture and the culture of farming, then we should not have to glance up at the sky.

/Question/ The correctness of these conclusions is borne out by the leading tractor-field crop brigades and sovkhoses, which even during severe drought conditions always obtain fine yields. Today they have already reached the level of 15-20 quintals of grain per hectare. The advantages of the soil-protective technology, similar to sensitive photographic film, are clearly manifested on the fields of our institute's experimental farm, which we often visit. Over the past 5 years, an average of 18.8 quintals of grain has been obtained from each hectare here. Last summer was especially dry -- not one drop of rainfall -- and the farm nevertheless obtained more than 16 quintals of grain per hectare. The brigade headed by Stanislav Ivanovich Gavriluk rarely obtains a yield that is lower than 20 quintals on the average. During the harvest we admired a tract of wheat having full-weight ears and found it

difficult to even believe this miracle. As we later learned, this field produced approximately 30 quintals of grain per hectare.

/Answer/ I would have to state that it all had to do with the skilful use of all of the agricultural methods associated with the soil-protective system of farming. Indeed, we do not wish to control each step taken by Gavriluk, but rather we wish to give him freedom of action for the sake of creativity. Such opportunities should be available on the whole on each farm in the virgin land.

/Question/ Aleksandr Ivanovich, initially the soil-protective agricultural practices developed by the institute's collective turned out to be of a general nature for northern Kazakhstan (prior to 1970, it was referred to as the virgin land system) and was suitable for all regions throughout the country threatened by erosion. There are approximately 100 million hectares of such land in the Soviet Union. It is by no means an accident that the sweep method of soil cultivation is already being employed on a vast area approaching 50 million hectares. In speaking before the All-Union Agrochemical Conference held in December 1980, member of the Politburo of the CPSU Central Committee and secretary to the CPSU Central Committee M.S. Gorbachev noted: "Numerous examples of work performed at kolkhozes and sovkhoses have shown that fine yields are obtained during any year by those who operate their land on a scientific basis, improve its fertility regularly and carry out their farming operations in a stable manner. An example of a creative approach in developing a farming system is the work performed by the collective headed by Academician A.I. Barayev, who furnished an effective soil-protective system for the regions of northern Kazakhstan and a number of other regions throughout the country. This experience is deserving of further dissemination." Is your system such that it can be considered as basic for all farming?

/Answer/ Truly, the soil-protective methods are being employed on fields in western Siberia, the Altay region and in Orenburg, Rostov, Nikolayev, Poltava, Zaporozhye and other oblasts, in the Volga region and in Stavropol Kray. Yet obsolete methods are still being employed in many areas, where the workers are stubbornly clinging to the plow, shredding the wonderful chernozem soil to pieces and thus allowing moisture to be borne off by the winds. And regardless of what zone in the country you select -- at times there will be a deficit of moisture and at other times a surplus. And the fertility layer in many areas is being destroyed. In some places by the wind and in other areas by water. I am convinced: farming must be soil-protective everywhere throughout the country. At the same time, by no means is it my intention to recommend for use in all areas the methods which we are employing in the virgin lands. Moreover, I wish to warn those concerned that they should not blindly copy our example. Every year the Poltava field crop growers obtain their grain. They have a true weapon for combating the adversities of weather -- the soil-protective system of farming. And they did not simply bring sweeps from Kazakhstan, but rather they created their own system, based upon their own soil-climatic peculiarities. Indeed, it is impossible in agriculture to have instructions available which cover all situations. Once again, creativity is required.

/Question/ During the difficult years devoted to developing the principles of soil-protective farming, your associates were V.P. Kuzymin, A.A. Zaytseva, P.P. Kolmakov, V.M. Slobodin, B.M. Pechatnikov, K.D. Postoyalkov and other scientists. Subsequently, such colleagues of yours as P.I. Khlebov, E.F. Gossen,

M.K. Suleymenov, O.S. Khorikov, I.G. Zinchenko, N.M. Bakayev, A.M. Nesterenko, I.P. Okhin'ko, N.V. Shramko, V.I. Kiryushin, Ye.I. Shiyatyy, A.S. Buryakov, M.I. Matyushkov, A.F. Kirdyaykin, N.P. Safronov, P.L. Sychev and the director of the experimental farm A.A. Seleznev made their own contributions towards the development of this system. Your pupils expanded and intensified their studies in the fields of farming, mechanization, agrochemistry and feed production. Many of them headed leading subunits of the institute. What problems is your collective working on at the present time?

[Answer] First of all, we are striving to make out own contribution towards carrying out the country's Food Program. And we have many problems in this regard. A scientist must never live only for today. He is also responsible for seeing into the future. A large program of studies has been launched in connection with feed production problems. The problems concerned with radically improving the natural feed lands and developing the solonetz soils are very vital ones for the virgin lands. There are more than 70 million hectares of solonetz soil alone in Kazakhstan. The Central Committee of the republic's Communist Party has assigned the task of creating a complex of machines for cultivating the solonetz soils and developing recommendations for their correct utilization. These vast barren tracts must be restored to life and made useful once again. When employed in a skilful manner, the solonetz soils are capable of furnishing high feed yields and subsequently -- grain. The scientists and designers are persistently striving to solve this task. Practical recommendations have been composed and experimental implements have been created for substantially improving the solonetz lands.

An important reserve for increasing the production of grain is that of converting over to sowing grain crop varieties which will be more productive and more adaptable to the local climate. In recent years the north Kazakhstan Plant Breeding Center for the breeding of new varieties of grain crops and perennial grasses has intensified its work considerably. The spring wheat varieties Tselinnaya-20 and Tselinnaya-21 and the Tselinnyy-5 barley variety have gained general recognition not only in Kazakhstan but also beyond its borders. Nevertheless, the problem still remains; the virgin lands require new, earlier ripening and more productive varieties of strong and durum wheats.

It bears mentioning that the virgin land fields are still not being supplied with adequate quantities of mineral fertilizer. We have established the fact that an application of 1.5-2 quintals of superphosphate per hectare raises the cropping power by 3.5-4 quintals. In Kazakhstan alone, this will furnish many additional millions of tons of grain. And if the soil-protective system of farming is mastered in an intelligent manner in all areas throughout the republic, if up to 3 quintals of superphosphate are applied per hectare of sowing and if nitrogen is applied to the less fertile soils, then the annual production of grain can be increased even more.

It is very important for a grain grower not to rest content with that which has already been achieved and we agricultural scientists also consider ourselves to be grain growers. However great the successes, reserves for further growth are still always available.

For example, for an extended period of time our institute advocated the five-field crop rotation plans.

/Question/ And what happened. Did your approach turn out to be wrong?

/Answer/ No, we acted correctly. The experimental farm, after mastering these plans, achieved fine results and the yields speak for themselves. But we continued our studies still further and drew the conclusion that a six-field crop rotation plan holds more promise for chernozem soils. Oats, which was wrongly forgotten, is being added to the wheat and barley. As a result, the yields are increasing. However, in some areas this innovation of ours was received rather coldly. It was said that the wheat areas are being decreased somewhat and that this raises the danger of a reduction in its production. But this is a superficial attitude. First of all, we raised the objection that a hectare under the new crop rotation plans is more productive. Secondly, the need for forage grain is very great since without it animal husbandry cannot be developed on an intensive basis. Why feed the livestock wheat, which we refer to as being golden? Is this being thrifty? Would it not be better to substitute barley or oats for it, the feed value of which is higher than that for wheat? It would seem that the solution is an obvious one and yet only slow progress is being made. Once again, time is required in order to overcome the inertia of reflection.

There are still many problems which trouble us greatly. The virgin lands are still not revealing their true potential; not all of the reserves have been placed in operation. And its grain, and it follows, economic potential must increase steadily.

An ear of wheat is formed not only by earth and solar juices. Nor are the generosity of an ear or the grain growing strength of a virgin land hectare dependent only upon a farmer. In the final analysis, the yield obtained is dependent upon harmonious work being performed by all branches of the national economy.

/Question/ Aleksandr Ivanovich, last year you celebrated your 70th birthday. And just as in the past we see you as a purposeful and industrious individual, with new plans, ideas and thoughts.

/Answer/ In my opinion, a youthful soul is not necessarily associated with age. It was always my fate to mobilize my strengths constantly in the interest of moving forward and being in the thick of life. I was born in pre-revolutionary Pitere and my childhood was spent in a remote northern forest district near Vytegra. During my youth, the roads led me to the steppe. I have been associated with Kazakhstan for almost 5 decades and it is now already 30 years -- with the virgin lands and the land of the great Komsomol feat. And all of this time I spent among tireless and spirited young people -- and it was from them I adopted the ebullient energy of youth.

/Question/ We have been informed that one of your favorite songs is "Dal' Velikaya" and its open and free melody. Is this not so?

/Answer/ This is true. For me, the greatest happiness is to be in a field when the wheat is ripening and the stalks, heavy with ears, reach down and touch your palms. At such times, I sense an indissoluble union with the grain steppe.

And this emotional state is very much in keeping with the words of the song:
"I bow low before you, land; I bow from the waist before you."

Happiness -- to sense your participation in the virgin land achievement of our people.

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AGRO-ECONOMICS AND ORGANIZATION

ECONOMIC INTERRELATIONS OF MOLDAVIAN APK BRANCHES DISCUSSED

Kishinev KOMMUNIST MOLDAVII in Russian No 12, Dec 83 pp 49-55

/Article by B. Subashi, candidate of economic sciences: "Improvement in Interrelations Under Conditions of Specialization and Interfarm Cooperation"

/Text/ The development of agriculture at the stage of mature socialism is characterized by the intensification of specialization, rise in the level of concentration and strengthening of the production and economic relations of farms in branch and interbranch aspects. As a result of the implementation of the party policy of strengthening interfarm cooperation and agroindustrial integration, a powerful material and technical base encompassing both the production and social infrastructure has been established in the Moldavian SSR. Under these conditions the solution of the problem of economic regulation of the activity of interfarm formations becomes ever more urgent. The establishment and strengthening of the economic mechanism adequate to the present stage in the development of socialist society also acquires decisive importance here.

In the process of division of labor and establishment of interfarm formations the production and economic relations of the participants in cooperation become complicated in the agricultural and agroservice sphere. Their improvement is based on a fuller and more systematic utilization of cost accounting principles under the dominating effect of the economic efficiency of production of the end product over the intermediary product and on a combination of public interests with the interests of collectives of individual enterprises.

Prices appear as some of the basic economic levers stimulating the attainment of planned production results. The level of these prices of the output of industry, transport, construction and other branches should correspond to the level of the prices of agricultural output. The disproportion in the share of the income created and utilized in the agrarian sector of the country's economy has been smoothened out significantly in recent years. As before, however, there are problems in economic interrelations between agriculture and more than 90 branches of the national economy delivering their output to it; agriculture and 30 branches of light and food industries working directly with agricultural raw materials, as well as with almost 60 branches utilizing materials and semifinished products of agricultural origin; branches of agriculture proper; agricultural and agroservice formations, as well as among farms participating in interfarm cooperation.

The prices of industrial output and services rendered to agriculture are insufficiently connected with quality and with their real economic and social effect on an increase in production efficiency. As a result, during the 10th Five-Year Plan, as compared with the 8th Five-Year Plan, the share of material resources in the value of gross output of the branch in the kolkhoz-cooperative sector increased by 2.7 points and in the state sector, by 20 points with a certain differentiation throughout individual periods. The increase in the material intensiveness of agricultural output lowers the expenditures of live labor. Unfortunately, however, the growth of its productivity is not accompanied by an increase in profitability. Two tendencies are manifested here.

The decrease in the expenditures of live labor does not lower the share of the payment for it in the value of gross output, which is determined to a significant measure by the objective process of growth of the income of agricultural workers primarily in the kolkhoz-cooperative sector, as well as by the insufficient coordination of the productivity of labor with the payment for it.

The increase in the volumes of proceeds from the sale of agricultural output during the 10th Five-Year Plan, as compared with the 8th Five-Year Plan, comprised 74.2 percent in the republic's kolkhoz-cooperative sector and 195.9 percent in the state sector. At the same time, an outstripping increase in the production cost of sold output was observed.

To ensure the increase of 20 to 22 percent in gross agricultural output envisaged during the 11th Five-Year Plan, the level of combined profitability in the public sector of the Moldavian SSR should comprise 46 to 50 percent, including 55 to 59 percent in the state sector and 41 to 44 percent in the kolkhoz-cooperative sector. However, it is now much lower, which hampers a full utilization of objective possibilities for the implementation of expanded reproduction in the given volumes. This, in turn, has a negative effect on the utilization of production capacities in branches consuming agricultural output--food, light and other branches. At the same time, for example, in the branches of Moldavia's processing industry the amount of profit per worker is five times and more higher than in agriculture. In these and a number of other APK branches the profitability level is less subject to periodic drops. This is due to the fact that the prices of the output of industry and other APK branches are revised as wages are regulated and a number of other objective and subjective factors are changed. However, the purchase prices of the output of agriculture are revised much less commonly. The residual-temporary approach to price formation, in which the new price level is established only after a stable decline in production profitability, has been in effect here until now.

The decree of the CPSU Central Committee and the USSR Council of Ministers "On Improvement in the Economic Interrelations of Agriculture With Other National Economic Branches" envisages, when the level of purchase prices of agricultural output for the next five-year plan is determined, proceeding from the need to ensure the branch standard of combined profitability with due regard for the planned volumes of production and purchases, the equipment of

farms with capital, the wage level and other planned expenditures on its production. The fact that, when proposals on the purchase prices of agricultural output and their increments are worked out, an interconnection between the change in the prices of industrial output sold to agriculture and in the prices and rates of services rendered to the branch and the level of purchase prices will be ensured, is very important. Along with this it seems that it would be advisable to establish more dynamic and flexible economic levers of regulation of the relations of agricultural enterprises with the state sensitively reacting to objective factors in production and making it possible, regardless of the change in weather conditions, to maintain the economy of farms at the planned level.

The effectiveness of the practical application of the provisions of this decree is due to the innovative structure of the economic interrelations of agriculture with the consumers of its output, in which they are not yet always equitable. There are frequent cases of multihour idle time of transport with products, or of refusal of procurement and processing enterprises to accept freight. Although in each specific case the reasons for refusal or idle time are dictated by objective circumstances, nevertheless agricultural enterprises incur losses from these disorders.

To eliminate the shortcomings in the delivery of output to the state, the CPSU Central Committee and the USSR Council of Ministers adopted the decree "On Additional Measures To Ensure Prompt Harvesting, Procurement and Processing of Sugar Beets of the 1983 Crop." This important document indicates the basic ways of improving the organizational, material-technical and economic interrelations of agricultural enterprises with procurement and processing organizations. A similar decree by the Central Committee of the Communist Party of Moldavia and the Moldavian SSR Council of Ministers specifies the schedules of delivery of sugar beets, as well as other measures aimed at an improvement in the organizational-economic activity of the entire sugar beet subcomplex of the republic's APK. At the same time, as it seems to us, a number of other aspects of an organizational and economic nature should be reflected in forward contracts, which will make it possible to improve economic relations in this production.

Under the conditions of the planned economy the interaction of partners in the process of production is regulated by economic contracts, which specify the conditions of delivery of output, that is, periods, quantity, quality and assortment, as well as economic and legal sanctions for the violation of contractual terms. However, the mutual compliance of the parties is often reflected in practice. This is primarily the result of insufficiently and not thoroughly substantiated contractual terms and of the poor work of legal services.

Along with strengthening planning and contractual discipline, as well as the material and technical base of procurement and processing organizations, it is also necessary to revise the rates of transportation of agricultural freight. It seems that it would be advisable to establish strict control, to apply economic sanctions for the idle time of transport with agricultural

freight and to ensure compensation for losses of output and transport expenditures in case of return of output. The strengthening of mutual material responsibility will stimulate the establishment of services for the centralized delivery of output at procurement and processing enterprises.

To improve the rural economy, after the May (1982) Plenum of the CPSU Central Committee the purchase prices of a number of agricultural products were increased considerably and increments on the purchase prices of output sold to the state by low-profitability and unprofitable kolkhozes and sovkhoses were introduced, for which 16 billion rubles per year were additionally allocated throughout the country. In the Moldavian SSR, as a result of the increase in the prices of beef, pork, mutton, poultry, milk, wool, wheat, corn, barley, sunflower seeds, soybeans, sugar beets, potatoes, vegetables, grapes, fruits and tobacco, as well as the introduction of increments on the purchase prices of low-profitability and unprofitable agricultural output, under the formed structure and level of production costs the calculated level of profitability in the public sector will comprise approximately 22 percent. However, even after the rise in purchase prices the lowest level of profitableness of livestock products, especially beef, pork and wool, remains. Their production remains low-profitability or unprofitable. At the same time, the production of plant products, on the whole, ranges within 70 percent and such crops as soybeans, essential oil crops and sunflower seeds reach 100 percent of profitability and more.

Undoubtedly, it is necessary to stimulate output specific for the Moldavian SSR. However, it should also be taken into consideration that at present purchase prices are built on the basis of the practice of multibranch farms, on which losses or the low level of income from one branch are covered by income from another branch. As farm specialization intensifies, these possibilities become fewer and fewer and the differentiation in the income level and, accordingly, in the wage level and amounts of economic incentive funds is manifested ever more strongly.

An especially complex financial situation is formed at interfarm enterprises for animal husbandry and feed production. As noted at the June (1983) Plenum of the CPSU Central Committee, science has not yet suggested substantiated price formation principles to practice. Therefore, with the present approach to price formation it is necessary to strengthen the nonprice mechanism of regulation of economic relations. Under the conditions of specialization and cooperation centralized funds deserve close attention. A certain practice of their use has been formed in a number of the country's production and rayon agroindustrial associations. Experience in their creation and utilization at the republic level has been accumulated. Nevertheless, the principles and criteria of formation of centralized funds require further improvement on the basis of the application of stable long-term standards. It is necessary to expand and intensify the zone of application of such funds at the rayon level with the utilization of economic land evaluation.

As specialization and the division of labor intensify, cooperated relations between the branches of agriculture proper and agroservice formations expand. In the gross output of agriculture in the public sector the share of interfarm enterprises comprised 15.4 percent and in the kolkhoz-cooperative sector,

26.4 percent. As the level of specialization, cooperation and intensification of agricultural production rises, a number of problems in the technological and economic functioning of interfarm formations, rationalization of their economic relations, regulation of the entire system of the economic mechanism, that is, planning, management, cost accounting, price formation, economic stimulation and material responsibility, and improvement in the organizational forms of production are manifested ever more acutely. Whereas previously only the consolidation of economic relations with cooperated farms was the most acute problem, as their organizational and economic base is formed, strengthening relations with the state and other national economic branches is also added to the mentioned problem. This is due to the fact that the reality of the cost accounting relations of cooperated farms with interfarm formations of agricultural and agroservice specialization depends on the degree of substantiation of the economic relations of agriculture with the state along the line of planning state purchases, material and technical provision, formation of purchase prices and a number of other economic levers.

The conditions of establishment and strengthening of the material and technical base of interfarm formations, determination of accounting prices of the output of interfarm turnover, distribution of income and utilization of economic incentive funds are the most important aspects of the economic relations of farms participating in cooperation.

At the beginning of 1983 the amount of share participation of cooperated farms in all the interfarm formations of the Moldavian SSR Kolkhoz Council totaled 676.7 million rubles, of which kolkhozes accounted for 82.9 percent, sovkhoses, for 10.3 percent and other enterprises and organizations, for 6.8 percent. On the average, in the republic every kolkhoz participates in the activity of 5.3 interfarm formations and the amount of the share contributed by them is 1.5 million rubles. The amount and proportion of the contribution of every farm to interfarm formations of varying production specialization differs, which to some extent is due to the application of diverse principles and criteria of calculation of share participation. The real economic possibilities of cooperated farms in diverting part of their income into share participation are manifested here as the decisive factor. In connection with this there is an acute need for the determination of indicators and criteria that would make it possible to disclose the objective economic possibilities of every farm in interfarm cooperation. An analysis shows that the amount of agricultural land and the obtained net income appear as the integral indicator in the determination of share participation. These indicators combine an objective factor, that is, land areas, and a subjective factor (predetermined by specialization, provision with labor and material resources, the level of management and so forth), that is, net income. Proceeding from the calculated general amount of share participation for each type of cooperation, basically, it is possible to utilize the particular indicators and criteria of share participation recommended by the All-Union Scientific Research Institute of Economics of Agriculture.¹

1. "Metodicheskiye rekomendatsii po mezhkhozaystvennomu kooperirovaniyu v sel'skom khozyaystve (napravleniya, organizatsionnyye formy i etapy razvitiya, ekonomicheskii mekhanizm khozyaystvovaniya, metody obosnovaniya i otsenki)" /Methodological Recommendations for Interfarm Cooperation in Agriculture (Directions, Organizational Forms and Stages in Development, Economic Mechanism of Management and Methods of Substantiation and Evaluation)/, Moscow, 1980.

At present all the interfarm formations in the republic conclude contracts for production cooperation with cooperated farms, for which their standard logbooks taking into consideration the specific nature of production have been worked out. On the whole, the particulars of standard contracts meet production requirements, but their practical application is of a limited nature. This occurs for a number of reasons. First, when they are concluded, the real needs and possibilities of cooperated farms and interfarm formations are not taken into consideration to a sufficient degree. An analysis of the concluded contracts shows that already at the stage of their signing individual provisions cannot be fulfilled. Second, contracts are concluded mostly during the period under review, without the performance of the appropriate preliminary work and coordination. As a result of such an approach, the planning and organizing function of contracts is not manifested in practice. It seems that preliminary work on their coordination and formulation should be done during the period preceding the planned period and concluded by the beginning of the formulation of production and financial plans. This will make it possible to take into consideration the possibilities and needs of participants in joint production and, at the same time, to correct it both on cooperated farms and in interfarm formations. Third, sanctions are hardly applied, because the principle of mutual forgiveness of shortcomings is in effect. The existing statutes on the regulation of economic relations, according to which the profit of interfarm formations belongs to cooperated farms and the "residual" principle of its distribution is applied, serve as the motive for this. Therefore, the exacted or paid economic sanctions affect the amount of derived profit. Since its residual amount is subject to distribution among cooperated farms, on the whole, for the latter the amount of exacted or paid sanctions is reflected in the decrease or increase in the profit distributed among them.

For the purpose of intensifying the effect of sanctions on the economic mechanism of cooperated production, the source of their payments should be revised. It would be advisable to coordinate and intensify the interaction of the mechanism of economic sanctions with economic stimulation. Furthermore, it is advisable to impose on the legal service of rayon kolkhoz councils the duty of intensifying control over the fulfillment of contractual terms. In cases of incorrect settlements of accounts or nonimposition of sanctions for a breach of contractual obligations it should recover deficient or overpaid funds in favor of the farms that have suffered. It seems that it would be correct to use in the economic interrelations of farms participating in cooperation a procedure, in which farms guilty of a breach of contractual terms would also pay a fine to the centralized fund at the rayon level.

Prices, as well as the mechanism of income distribution, appear as the decisive factor in the substantiation of such relations. When the prices of products of interfarm turnover are formed, the compensation for production costs at the standard level and the consideration in them of the planned level of accumulations making it possible to implement expanded reproduction in equal proportions for all farms participating in cooperation is obligatory. The amount of profit obtained from the sale of the end product of cooperated production is the maximum amount of profit incorporated in accounting prices. Disregard for these conditions and the preferential stimulation of the production of intermediary products, services or operations at the expense of

others have a negative effect on the economic efficiency of the entire technological chain, violate the principles of cost-accounting farm management and cause undesirable migratory processes. The lack of sufficient consideration of specifically economic interrelations in cooperated production and the intensification of the nonprice mechanism of income distribution often lead scientists and practical workers to unsubstantiated conclusions and, accordingly, proposals. For example, the attempts by means of the prices of products of interfarm exchange to solve all the problems of economic development of specialized formations are accompanied by the intensification of their economic isolation, at the same time, not stimulating their striving for an increase in the efficiency of the end product and, what is most important, neither a unity of interests, nor an equal level of incentive funds per unit of labor, is attained in this case. At present a practice has emerged, when the level of utilization of incentive funds in all interfarm formations to some extent does not reflect the economic possibilities of cooperated production and to a significant extent smoothens out the shortcomings existing in price formation. For example, in all the interfarm formations of the Moldavian SSR Kolkhoz Council in 1981 a total of 112 rubles per worker were assigned from profit into incentive funds and 150 rubles were spent. Throughout Kolkhozhivprom the indicators cited are 86 and 158 respectively, including in the association for feed production, 70 and 158 and in associations for the mechanization and electrification of agricultural production, 92 and 113 rubles.

As a result of the intensified stimulation of collectives of intermediary links of some interfarm formations, the amount of their personal consumption funds (wages plus incentive funds) exceeds the existing level of such funds on the republic's kolkhozes and the economic possibilities of cooperated production. At the same time, the rates of labor productivity growth are not taken into consideration.

Economic relations formed in the agroservice sphere were poorly coordinated with the production and economic results of agricultural production and the level of income obtained by them was not commensurate with the income of agricultural enterprises of the serviced zone. While the general level of profitability of agrochemical work of the Scientific Production Association for Agrochemical Services to Agriculture in 1982 was 20.2 percent, in the application of organic fertilizers to soil profitability comprised 37.3 percent, in the treatment of agricultural land with pesticides with the utilization of ground machines, 28.6 percent and in the carting of organic fertilizers and the application of mineral fertilizers to soil it exceeded 20 percent. In a number of operations a high level of profitability was attained not owing to a decrease in production costs, but as a result of a rise in release prices. For example, as a consequence of the increase in the value of prices for the application of 1 ton of organic fertilizers agricultural enterprises paid 359,000 rubles.

The decree of the CPSU Central Committee and the USSR Council of Ministers "On Improvement in the Economic Interrelations of Agriculture With Other National Economic Branches" for the regulation of mutual settlements of accounts establishes a profitability standard of 8 percent in relation to the cost of jobs and services rendered by service organizations to kolkhozes, sovkhoses and other agricultural enterprises and organizations.

Along with an excess of the level of actual prices over planned prices of certain types of operations a tendency toward overstating planned prices proper is manifested. In this connection the decree of the CPSU Central Committee and the USSR Council of Ministers establishes that rayon production associations and departments of the Agricultural Equipment Association and the Scientific Production Association for Agrochemical Services to Agriculture, as well as some other agricultural service enterprises, should return 50 percent of the above-plan profit derived from the activity connected with their servicing in proportion to the volumes of performed operations.

The specific condition of economic relations of the state-cooperative Scientific Production Association for Agrochemical Services to Agriculture is the fact that it assigns part of its profit to member farms and deducts part of the profit into the general state budget. The funds subject to transfer to member farms account for about 10 percent and the deductions of the disposable balance of profit into the budget, for much more. It seems that it is advisable to establish a procedure of profit distribution, in which the proportion of the funds assigned from the profit derived from production and supply activities for making current payments and the creation of envisaged funds would be commensurated. The remaining funds from each type of activity should be assigned to member farms and to the state budget respectively.

Thus, the production and economic activity of agricultural formations is mediated by complex and multifaceted economic relations, which are improved as objective conditions ripen.

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AGRICULTURAL MACHINERY AND EQUIPMENT

CEMA PLANS FOR MORE EFFICIENT AGRICULTURAL EQUIPMENT VIEWED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 4,
Apr 84 pp 40-43

[Article by Stayu Dimov, section head of the CEMA Secretariat: "The Intensification of Agriculture"]

[Text] The CEMA member nations, in solving the food problem, are paying primary attention to strengthening the physical plant of agricultural production. The tractor fleet in 1982, in comparison with 1970, had increased by 44.5 percent and reached 3,944,000 units. The total nominal engine capacity had risen by 97.2 percent and was 282 million hp. At present, as an average for the CEMA nations the amount of energy available in agriculture has reached 95.6 hp per 100 hectare of plowed lands and perennial plantings [orchards and vineyards]. The area of plowed lands and perennial plantings per tractor has declined by 28.2 percent and equals 71 hectares. In the agriculture of the fraternal countries in 1982, there were more than 900,000 grain harvesting combines and this is 20 percent more than in 1970. The number of trucks had almost doubled and their total load capacity had increased. The supply of the agricultural enterprises with other machines and equipment has improved.

Along with quantitative growth in recent years, there have also been significant qualitative changes. The rated power of the tractors has increased. The share of self-propelled machines has risen. More and more agriculture is being supplied with highly productive harvesting equipment. Progressive elements are being incorporated in the designs of the machinery and tractors being developed. The working conditions for the operators have been greatly improved.

The power-to-labor ratio is one of the basic indicators for the greater equipping of agricultural production. The structure of energy capacity in the agriculture of a number of CEMA countries is shown in Table 1.

Characteristically over the last 10 years in Bulgaria, Hungary, the GDR and CSSR, the tractor fleet has declined but the increase in the available power has not dropped. In the other fraternal countries, particularly in the USSR, there has been an intensive increase both in the number of tractors and in the energy available for agriculture.

Table 1

Structure of Energy Capacity in Agriculture of Certain CEMA Countries in 1982

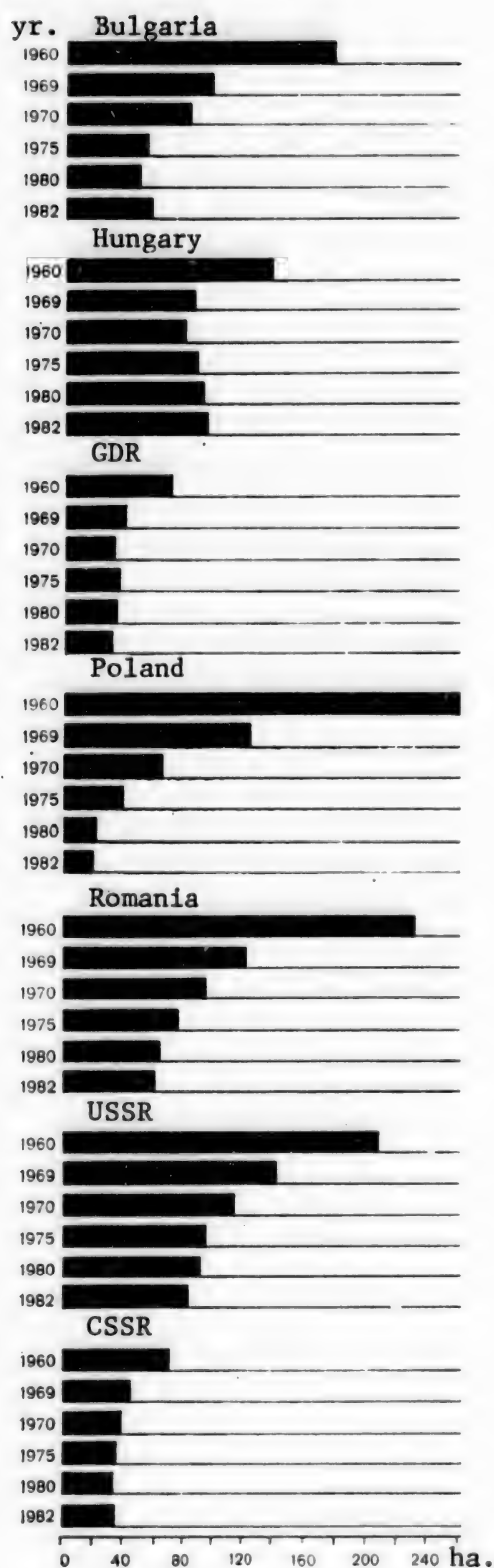
Type of Energy Capacity	Bulgaria	Hungary ¹	Poland	USSR	CSSR
Engines:					
of tractors and self-propelled chassis	33.95	44.33	58.49	35.65	39.80
of trucks and semis	22.00	31.44	7.40	27.95	23.79
of combines	13.03	11.47	8.06	12.64	9.90
Electric engines and electric units	16.25	--	22.43	21.16	21.35
Other mechanical engines	12.96	16.03	1.22	2.24	5.04
Draft animals	1.81	0.73	2.40	0.36	0.12

¹ Without electric motors.

Table 2

Supply of CEMA Nations With Certain Agricultural Machinery in 1982

	Unit	Bulgaria	Hungary	GDR	Poland	Romania	USSR	CSSR
Per 100 hectares of plowed lands and perennial plantings:	units	1.47	1.04	3.09	5.0	1.49	1.17	2.56
Tractors		5.60	5.30	10.20	3.5		7.30	11.90
Trucks	"	6.20	8.10	5.20	4.9	11.90	5.80	6.90
Combines per 1,000 hectares of cereals	hp	66.0	80.0	67.0	41.0	62.0	79.0	67.0
Average tractor power								



Dynamics of Decline in Area of
Plowed Land and Perennial Plantings
Per Tractor

The dynamics in the decline of the area of plowed land and perennial plantings per tractor can be seen from the bar diagram. In 1982, this indicator equalled 68 hectares in Bulgaria, 96 in Hungary, 35 in the GDR, 102 in Mongolia, 20 in Poland, 60 in Romania, 85 in the USSR and 39 in the CSSR.

In a number of the socialist commonwealth nations there has also been a significant decline in the number of combines and an increase in the area per machine. In the GDR, in 1982, the number of combines in comparison with 1970 declined by 23.5 percent, in Romania by 15 percent, in Bulgaria (in comparison with 1975) by 12.3 percent and in the CSSR by 11.8 percent. Obsolete machines have been replaced with new ones having higher capacity and productivity. In the GDR, since 1970, the fleet has been virtually completely replaced by more productive combines of the E-512 and E-516 types with a sharp decline in its composition.

At the same time there has been a replacement of the fleet of silage, corn, beet and potato harvesting combines, mowers, drills and other agricultural machines. The process of saturating agricultural production with new highly productive equipment has occurred actively in the CEMA European nations, particularly in the USSR (Table 2). For example, in the USSR during the 8th Five-Year Plan, 75.2 percent of the new tractors went to replace ones that were being written off and only 24.8 percent for increasing the fleet; during the 9th Five-Year Plan the figures were, respectively, 78.8 and 21.2 percent and in the 10th, 87.4 and 12.6 percent.

In Bulgaria, the CSSR and particularly in Hungary in recent years agricultural production has been supplied with high-powered tractors and this has led to a certain decline in the total tractor fleet in these countries.

Under the conditions of supplying agriculture with more powerful tractors and highly productive self-propelled machines, the methods of increasing the efficient use of the machine-tractor fleet, both extensive and intensive, have assumed particular significance.

The extensive method consists in increasing the number of days, shifts and operating hours of the agricultural machines over the year. However, due to the specific features of this sector, the operation of the equipment is limited to certain agrotechnical times. Even under good conditions there can be stoppages due to meteorological, organizational, technological and production factors. The length of use of the equipment over the year can be increased only by strictly observing the optimum farming dates for carrying out the farm work.

An improved shift factor for the machine and tractor units is one of the extensive factors contributing to the higher efficiency of their use. This can be substantially increased having carefully studied the nature of the agricultural work, the seasonal factors, climatic conditions and the crops grown. For example, in reclamation and transport work on leading brigades and farms this coefficient equals 2 and more. It can also be raised to 2 in plowing, harrowing and discing. With inter-row cultivation and harvesting, the indicator virtually reaches 1.5. However, the average shift factor for the entire tractor fleet and individual groups of tractors is lower. Its average annual amount for the entire tractor fleet in Bulgaria in recent years has been 1.15-1.18 in utilizing the working time fund over the year by some 50-55 percent. In the USSR, the average shift factor for high-powered tractors of the 5TS class equals 1.10 and for the 3TS class 1.08.

The experience of the advanced equipment operators in the CEMA member nations shows that an annual average shift factor equal to 2 and more and the utilization of 75-77 percent of the working days per year are a completely feasible goal to which one must work.

The converting of the tractor fleet to two- and three-shift operating conditions will make it possible to increase the period of its operation. For the high-powered tractors and reclamation tractors this can reach 3,500-3,800 hours and for combines 350-400 hours a year.

Table 3 shows what an enormous reserve existed in 1980 for increasing the length of use of the tractors over the year up to the level of the indicators of the best equipment operators.

The saving of time within a shift is another extensive factor for increasing the effectiveness of the machine and tractor units which is of great importance. Reducing equipment stoppages due to technical, production and organizational factors makes it possible, as research has shown, to increase productivity by 25-30 percent without lengthening the working time. Merely due to this it would be possible to reduce the fixed capital by 25-30 percent and the cost of the work by 5-8 percent.

The intensive method for the efficient operation of agricultural equipment is characterized by the highly productive use of working time in the shifts by a fuller load considering the capacity and productivity of the machines; by the

rational making up of the tractor units on a basis of the optimum ratio between the working width and the working speeds; by improving the organization of the production processes; by improving transport and sociodomic services for the equipment operators and by organizing the labor of the machine-tractor fleet and its management.

Table 3

Average Tractor Utilization
(operating hours per year)

Country	Tractor Class		
	5TS	3TS	1.4TS
Bulgaria	2,524	2,596	1,903
Hungary	2,348	2,535	1,851
GDR	1,780	1,850	1,560
Poland	710	1,200	1,100
USSR	998	857	1,397

An intensive rise in the efficient use of agricultural equipment at the optimum farming times can be achieved by increasing the average operating length of the machines with the complete use of good weather conditions, expanding the mechanization of agricultural work, by better making up the tractors with machines and harvesting units with interchangeable attachments; by increasing the number of shifts per day by creating the required sociodomic and transport conditions for the equipment operators and increasing their availability for the machines; by increasing the hourly productivity of the machine-tractor units to the fuller utilization of net operating time in the shift, reducing stoppages caused by technical, production and organizational factors.

Along with replacing the machine-tractor fleet and filling it out with high-powered tractors, highly productive self-propelled machines and transport there are additional opportunities for increasing efficiency in the rational operation of new agricultural equipment.

The intensive employment of the machines helps to increase labor productivity, to reduce the time of agricultural work and to increase the crops, bringing closer the times of obsolescence and physical wearing out of the machines and in contributing to prompt replacement. International collaboration among the CEMA member nations in the use of agricultural equipment can help to increase its efficiency.

On the basis of exchanging experience it is advisable to work out recommendations on the optimum use of existing equipment under the conditions of the most progressive work methods and employment of advanced production methods, for the maintenance and safekeeping of the machines and for supervising the condition of the equipment, the training and skills of personnel.

The program for scientific and technical collaboration on the problem "Mechanization, Electrification and Automation of Production Processes in Crop and Livestock Raising" also includes the subject "Elaboration of the Scientific Principles for Operating the Machine-Tractor Fleet in Agriculture."

On the given subject Hungary has prepared methodological principles for working out the planning of the demand for agricultural equipment. The GDR has created a model for medium- and long-term planning of equipment for mechanizing crop raising. Poland has worked on testing the suitability of the measurements for energy expenditures on agricultural production and this makes it possible in a simplified manner to assess the equipping of the farms with tractors. There is also a method for determining the reduced losses of grain by the combines and a method for anticorrosion maintenance of the machines. The USSR has worked out the basic procedural principles for determining the optimum machine and tractor make-up, draft quality standards for carrying out the basic and presowing tilling of the soil, as well as documents for maintenance and safekeeping of agricultural machinery. The CSSR has prepared norms for energy consumption on individual agricultural jobs and has estimated the energy intensiveness of production for the basic agricultural products.

The scientific collectives from the countries studying the subject are investigating the methods of designing and selecting the composition of the machine-tractor fleet in accord with a system of criteria for the technical and economic evaluation of the machine-tractor units and organizing a dispatcher point for managing the mechanized jobs employing a computer. Instructions have been worked out on the rational utilization of heavy duty tractors.

In 1983, the Permanent CEMA Commission on Collaboration in the Agricultural Area approved additional subjects for incorporation in the program of scientific-technical collaboration under the agreement on the problem "Mechanization, Electrification and Automation of Production Processes in Crop and Livestock Raising for the Period 1984-1999"; these are "The Elaboration of a System for Calculating Machinery Productivity and Fuel Consumption on the Basis of the Readings of Instruments Included in the Equipment of the Machines"; "Theoretical and Practical Decisions for the Optimum Making Up of Power and Operating Machines"; "The Elaboration and Introduction of Methods and Devices for Monitoring the Losses of Farm Products in Harvesting Cereals, Potatoes, Beets, Coarse Feed and Other Crops."

Great joint work is being done by the nations involved in the agreement on multi-lateral specialization and cooperation in the production of equipment and instruments for testing, repairing and maintaining agricultural equipment. In 1983, there was the sixth session for the representatives of this agreement. It reviewed the reciprocal information on the course of carrying it out and on the results of concluding contracts and reciprocal deliveries for instruments and equipment.

During the session there was a scientific and technical conference on the subject "Modern Equipment and Production Processes for Rebuilding Worn Out Machinery Parts" and the exhibit "Remdetal'-83" [Part Repair-83] in Kiev (USSR). Participating in the conference were around 800 specialists from Bulgaria, Hungary, the GDR, Cuba, Mongolia, Poland, Romania, the USSR and CSSR. The conference

discussed the questions of employing fundamentally new labor-saving and no- and low-waste production methods, increasing the mechanization and automation of production processes in repairs and maintenance, improving the organizational structure as well as the methods for the technical and economic setting of specialization and concentration in the rebuilding of parts.

In the CEMA member nations it was recognized as wise to widely employ such progressive methods as electric arc welding, plastic deformation, the gas-thermal application of powdered materials, contact welding of a metallic layer, the applying of protective surfaces, electrophysical and electrochemical methods for the dimensional working of parts and so forth.

The representatives of the involved countries approved a decision to draw up proposals on the possibilities for specializing the production of the equipment and instruments exhibited at the fair in the aim of incorporating them in the agreement.

For increasing the efficient use of the machine-tractor fleet, the CEMA member nations are also cooperating in the technical maintenance and repair of machinery on the basis of the most advanced production processes employing the use of the best scientific and technical achievements under the subject "Collaboration in Improving the Effectiveness of Maintenance and Repair on Agricultural Equipment." In addition, scientifically sound systems for maintenance and repair have been worked out, schemes for developing and organizing repair and maintenance operations and their rational placement as well as for creating standard production processes. In addition to the step-by-step plan for this research, the Permanent CEMA Commission for Collaboration in the Area of Agriculture has approved a plan for multilateral collaboration among the CEMA member nations in the area of scientific-research and design engineering on the questions of the maintenance and repair of agricultural equipment in 1981-1985. This includes four subjects and there are plans to develop new equipment under two of them "Diagnostics" and "Rebuilding of Assemblies."

By the joint efforts of specialists within the mentioned plan, an international system of equipment for the repair and maintenance of agricultural and forestry equipment has been worked out.

This system has been set up for coordinating scientific research and experimental design work in the area of maintenance and repair as well as for utilizing and designing repair enterprises, the specialization and cooperation of production of equipment and its reciprocal deliveries.

The system contains basic concepts, provisions and standards disclosing the essence of the process of maintaining equipment in agriculture in a working state and making it possible to organize this process using modern methods and equipment on the necessary level. It is to be extended to the basic machinery groups: tractors, grain harvesting and other agricultural machinery.

The use of the system will help to improve the organizational, technical, production and economic measures and means ensuring the maintenance and returning the workability of machinery and equipment in the agriculture of the CEMA countries.

The Permanent CEMA Commission on Collaboration in the Area of Agriculture at the 59th Session (December 1983) approved the international system of equipment for the maintenance and repair of agricultural equipment and the system of maintenance and repair for the agricultural equipment of the CEMA member nations. The commission approved the areas for further collaboration in the realm of mechanizing agricultural production over the immediate future. These presuppose broader collaboration in working out proposals to employ automation (robots and microprocessor equipment) in the agricultural sectors, between agriculture and machine building in carrying out and improving an international system of machines as well as in developing new productive machines to carry out the comprehensive collaboration measures to improve the food supply for the population of the CEMA member nations.

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AGRICULTURAL MACHINERY AND EQUIPMENT

INTENSIFICATION OF LIVESTOCK, FEED PRODUCTION MACHINEBUILDING

Moscow EKONOMIKA SEL'SKOGO KHOZYAYSTVA in Russian No 4, Apr 84 pp 44-50

[Article by K. Belyak, minister of Machinebuilding for Animal Husbandry and Fodder Production: "Machinebuilding for Livestock and Feed Production"]

[Text] In accomplishing the important national economic task of providing agriculture with modern, highly efficient equipment, a leading place is assigned to machine building for livestock and feed production.

Until 1973 machinery production for livestock and feed production was spread out in plants of various ministries and departments. On the initiative of the CPSU Central Committee, in 1973 the sector of machine building for livestock and feed production was established, which consolidated in one complex the and production of the equipment necessary for the rural area.

Since the industry was organized, considerable work has been done on building its scientific and technical potential and production base. Scientific research, design, planning and industrial organizations have been reorganized. Operating plants have been re-equipped and new ones erected, taking into account the latest achievements of domestic and foreign machine building. Presently, the scientific and technical and production potential of the industry is made up of over 30 scientific research, design, and planning and engineering organizations and more than 100 production associations and enterprises.

Machine building for livestock and feed production is one of the dynamically developing sectors of the national economy. Between 1976-1980 over 200 new and modernized types of machinery and equipment were developed for full mechanization of livestock and feed production. At the same time, 85 types of outdated equipment were removed from production. Placed into production were a self-propelled field harvester, a self-propelled mower-roller, a rotary mower, a roto-type pick-up baler, units for preparing grass meal, equipment for preparing granulated and pelletized feed, large-capacity manure spreaders and other highly efficient machines which are twice to three times as productive as earlier produced equipment.

The volume of equipment production at the sector's enterprises in the 10th Five-Year Plan was as much as was manufactured during the three previous five-

year plans combined. Gross production reached 2.5 billion rubles, of which 2 billion rubles was machinery produced for livestock and feed production. Today, the fleet of machines in agriculture for feed production alone is two million units, and over 1.5 million various types of equipment are operated in livestock and poultry production.

Great tasks have been placed before the industry by the 26th Party Congress. In the Basic Directions of Economic and Social Development of the USSR for 1981-1985 and for the Period up to 1990 it is projected to increase production of a full complement of machinery and equipment and considerably expand the production of self-propelled forage harvesters and the output of machinery with increased productivity, carrying capacity and cross-country capability, as well as equipment for initial processing, cooling and storage of milk at the farms. In accordance with the Food Program, 29-30 billion rubles worth of machinery will be procured for livestock and feed production during the decade.

In implementing the decisions of the 26th Party Congress and subsequent CPSU Central Committee plenums, purposeful work is being conducted in the sector for building and introducing new, highly efficient equipment which meets the current needs of agricultural production. This work is being accomplished in accordance with the "System of Machinery for Full Mechanization of Agricultural Production for 1981-1990".

The system of machinery encompasses a 10-year period, which in fact provides for continuity of planning and makes it possible, with the participation of various ministries and departments, purposefully to resolve problems of introducing advanced production methods of cultivating agricultural crops, producing meat, milk, eggs and other livestock products. For 1981-1990, it calls for production of 644 various types of machines and equipment. For this over 300 new and modernized machines will have to be built and put into production.

A distinctive feature of the sector's activities in the 11th Five-Year Plan is the shift from production of machinery and equipment for mechanization of individual production process to the production of completed industrial banks of machinery and equipment for full mechanization of all processes of obtaining livestock products and feed. Today, out of the machinery and equipment produced by the sector, 108 of the 133 industrial assemblies called for by the System of Machines are being developed. For better use of capacities for producing complete sets of equipment, the Soyuzpromkomplekhtzhivmash All-Union Production Association has been specially organized, operating on cost accounting, and 18 specialized experimental plants have been built.

In fulfilling the tasks of the Food Program, in 3 years of the 11th Five-Year Plan workers of the sector have put into production 95 new and modernized machines of various descriptions. The production of basic types of machinery and equipment has also been increased considerably. In 1983 alone, the country's agriculture has been provided with about 40,000 field harvesters, over 10,000 of which are self-propelled, 32,800 pick-up balers, 44,300 tank-trailers for hauling ground feed, 4,700 self-propelled mower-rollers, 54,000

general-purpose loaders, 3,200 feed mixer-dispensers, 52,500 feed dispensers and 49,000 machines for liquid and solid fertilizer application into the soil.

The sector has great tasks to carry out in accordance with the resolution of the CPSU Central Committee and the USSR Council of Ministers "On measures for further increasing the technical level and quality of machinery and equipment for agriculture, improving utilization and increasing production and deliveries of them in 1983-1990". In putting this document into effect, 32 new machines were developed and 34 were modernized in 1983, which was above the established quotas. Among the new developments one can single out the machine for preparing vitamin meal, with a recirculation of coolant which reduces fuel consumption by 10-12 percent, the PND-250 continuous operation organic fertilizer loader, the KPS-5GP increased cross-country capacity self-propelled mower-roller, the OTsK-8 combined fodder unit, the RRS-F-5 silo unloader, the modernized TSN-160A barn cleaner with a round-link chain and others.

The intensive development of modern livestock production requires a considerable increase in feed production and improvement of its quality. The Food Program calls for increasing procurement of silage to 300 million tons, haylage to 90 million tons and hay to 100-112 million tons, that is, a 1.3- to 1.5-fold increase compared to the current level. Fulfillment of this task to a considerable extent is determined by satisfying the needs of agriculture in highly efficient equipment for making feed in all of the country's soil and climate zones.

In the current decade, the main forage harvesters will be the KSK-100 self-propelled field harvester and the KPS-5G self-propelled mower-roller, which will replace the low-productivity KS-1.8 "Vikhr" combine. These machines will increase labor productivity considerably in making haylage, silage and green bulk for preparing grass meal, granules and pellets and substantially improve work conditions of the machine operators.

The production of the KSK-100 self-propelled field harvester is increasing every year. Whereas in 1980 there were 4,500 of them produced, in 1984 will be made. In the next few years production of these machines will reach 20,000 per year. An increased cross-country capacity modification of the KSK-100 harvester has been developed for excessively damp zones. Production of the KPKU-75 pull-type combine for the T-150 tractor, standardized in main components with the KSK-100 self-propelled combine, began in 1983. There will be 7,000 of these combines produced in 1984, with a subsequent increase in the next few years to 20,000 annually. The field harvesters are equipped with devices ensuring the required degree of feed grinding which makes it possible to improve its preservation and to use transport more efficiently.

Re-equipping feed production on the basis of the self-propelled KSK-100 combines and the pull-type KPKU-75, standardized with the self-propelled combines, will make it possible during the intensive period of field work to free over 500,000 machine operators in production and transport of feed. A "weak point" in using highly productive combines is the shortage of increased

capacity transport vehicles. In this connection, tractor trailers with 15, 20 and 40 cubic meter bodies have been developed.

For haymaking, the steppe regions of the country will receive the SKP-10 self-propelled 5-bar hay mower with a 10-meter operating width and GP2-14A self-dump rakes. Their operation will make possible a 2.8-fold decrease in labor expenditures in cutting and drying of grasses.

More widespread introduction of advanced processes of making round and square hay bales will help reduce labor expenditures in feed production. In addition to the known roto-type (PRP-1.6) and ram (PS-1.6) hay balers, a baler for forming round bales weighing up to 750 kg and a baler for forming square bales weighing up to 500 kg are being built.

In the current five-year plan the country's kolkhozes and sovkhozes will receive more than 450,000 tractor mowers and 90,000 pick-up stackers and haystackers. Production of balers during the 5-year period will reach 163,000 and equipment for preparing grass meal, granules and pellets--about 40,000.

In fulfillment of the goals of the USSR Food Program for growth of production of livestock products, an important place is given to further increasing the level of full mechanization in livestock production. To this end a wide range of machinery and equipment for mechanizing production processes are being developed at a faster rate by the sector.

In accordance with the Machinery System, 80 new types of machines and equipment have been developed for cattle farms, 73 of which have been put into production. They include "tandem" and "yelochka" automated milkers which, except for putting the teat cups on the animal's udder, completely mechanize the operator's work. The use of automated milkers make it possible to increase labor productivity 3- to 4-fold. Furthermore, it provides for machine stripping and removal of the milker from the udder which precludes keeping it on the udder too long and reduces the chance of mastitis.

The increase in volume of milk production requires equipment for its initial processing and storage. For this purpose, milk tank-coolers have been developed, with capacities of 1,600, 2,000 and 2,500 liters. Series production of them began in 1983. Equipment is being developed for post-milking processing of the milk, making it possible to conduct heat treatment of the milk directly on the farm and deliver it to the consumer, by-passing the dairy plant. Such a system will permit increasing the amount of milk turned over as first quality and also lower costs per unit of production.

The level of mechanization of feeding at cattle farms has increased considerably during the first years of the 11th Five-Year Plan, but it is still insufficient compared to the level of mechanization of watering, milking and manure removal. Measures are being taken by the sector for eliminating this lag. The main machine for dispensing feed, the KTU-10, has been modernized; the capacity of its body has been increased to 15 cubic meters by extension sides which make it possible to make use of its carrying capacity more fully. The reliability of the linear conveyor has been improved by using

a calibrated (round-link) chain and the design of the beater unit has been improved. As a result, the dispenser's productivity has been increased by 13 percent, while lowering the specific metal content by 18 percent and increasing reliability by 28 percent. Production of the KTU-10 feed dispenser will be increased from 37,000 to 50,000 per year by the end of the 11th Five-Year Plan. The RSP-10 feed mixer-dispensers are being widely used and production of them has already exceeded 3,000. Series Production of the ARS-10 motor vehicle feed mixer-dispenser has begun.

Until recently, the main equipment for manure removal from livestock barns was apron conveyors whose reliability and durability were low. Today, the new TSN-10 manure removal conveyors and the US-10 and US-15 scrapers have been developed, 80 percent standardized and built on the basis of a single traction element--a round-link, calibrated, heat-treated chain. The service life of these machines has been increased 2.5-fold and the labor-intensiveness of installation reduced by 40 percent. The final operation of transporting the manure by a pipeline from the barn to the manure yard has been mechanized. Agriculture is being provided a cyclical operation unit which eliminates the need for hauling manure by tractor trailer.

A complete set of equipment of the KPG-10 type has been developed for raising and fattening young stock cattle with feed dispenser flow lines and also with machines and equipment for preparing and feeding milk replacers and liquid nutrient solutions and with stall equipment.

Compared to 1975, today the basic machinery park has increased 1.3-fold for milking machines, doubled for mobile feed dispensers and increased 1.5-fold for manure removal conveyors. Agriculture's demand for machinery and equipment for milking, manure removal and watering is being satisfied completely by the sector.

As a result of developing new equipment and increasing deliveries of it, the level of full mechanization at cattle farms has more than doubled in the past 5 years. The increase in the level of full mechanization with the annual growth in livestock and poultry population has made it possible to stabilize the number of workers employed in livestock production. With the increase in the level of mechanization, the direct labor costs for production of a unit of livestock product are decreasing. Presently, labor expenditures at fully mechanized farms are two-three times lower than at regular farms.

The amount of development and production of new machinery for mechanizing the production processes in sheep raising has increased. Complete equipment units are being put into production for sheep farms, including a sheep wintering and lambing station for 6,000 and 10,000 head; karakul sheep farms for 5,000 ewes; feeding areas for 10,000 lambs and also a feed plant. In order to increase efficiency of Romanovka sheep production, a mechanized cage is being put into production. Its use makes it possible to lower manual labor expenditures in raising lambs to between a half and a third of the current level. There are still 23 machines to be developed before 1990 for full mechanization of sheep production, including 18 in the current five-year plan. Widespread introduction of complete equipment units at sheep farms will lower labor

expenditures for production output to between two-thirds and half the current level.

Pork plays a large role in formation of the country's meat balance and its share in overall meat production is 35 percent. Over 70 various types of machinery and equipment have been put into production for mechanization of the manufacturing processes in hog production. Until recently, feed preparation was the most labor-intensive processing operation. The assimilation into production of nine modifications of machinery assemblies for feed plants has made it possible to mechanize this process totally at all types of farms. Today the sector is completely satisfying farms' demands for such feed plants. These measures have provided for an increase in the level of full mechanization in hog production from 56 percent in 1975 to 68 percent in 1983.

Methods of industrial production of agricultural output have been proving themselves most effectively in poultry production, where large fully mechanized farms began to develop earlier than in other subsectors of livestock production. Organizing the sector of machine building for livestock and feed production made it possible to accelerate considerably the development and mass production of fully automated equipment for raising and keeping poultry. Designs were developed and large-scale production organized of a new generation of coop equipment for laying hens, with automation of the basic production processes: cages for raising the young of egg breeds, meat broilers and also for keeping the parent flock. Production of new incubators with automatic control has begun.

Saturating the farms with complex modern equipment has enabled poultry farming to become one of the most mechanized sectors of agriculture, where the level of full mechanization is now 81 percent. This has had a favorable effect on its economic efficiency, as well as on the improvement of labor conditions of the poultry farmers. Whereas before the introduction of machine technology one poultry woman handled 800-1,000 birds, now she handles 25-30,000. Additionally, the nature of the work has changed: it has become a variation of industrial work. Labor expenditures for production of eggs and poultry meat have decreased substantially. Whereas in 1965 at the sovkhozes 18 man-hours were expended on producing 1,000 eggs, today it takes about 3 man-hours. Furthermore, not all the resources for increasing the efficiency of the means of mechanizing poultry production have been used. In the near future the reliability and other qualitative indicators of produced equipment must be increased considerably. In the 12th Five-Year Plan it is necessary to put into production a new generation of cages and outdoor equipment with measured poultry feeding, which will make it possible to reduce feed consumption per unit of production substantially and ensure a further growth of the economic efficiency of poultry production.

New, highly productive machines for applying organic fertilizers are being produced by the sector for the purpose of introducing industrial production processes of cultivating fodder, vegetable and other agricultural crops. The country's agriculture is receiving various types of machinery, including trailer-type solid manure spreaders with a carrying capacity of 6, 10 and 16 tons and machinery with a carrying capacity of 5, 8 and 16 tons for applying

liquid fertilizers. The average carrying capacity of machinery today has increased to 7.4 tons, as compared with 4.7 tons in 1975. New 23-ton capacity machinery for the K-701 tractor for applying solid and liquid fertilizers and units for subsoil application of liquid manure and top-dressing of tilled crops.

However, in the area of using organic fertilizers there are a number of unresolved problems requiring joint efforts on the part of industry, agriculture and planning bodies. First among them it is necessary to note the incomplete use of livestock waste as organic fertilizers. At a number of farms there are still few modern manure yards, especially for solid manure, and there are no unified requirements for preparing and storing organic fertilizers, which results in a loss of them and contamination of the environment.

The sector has begun to pay more attention to the development and introduction of means of small-scale mechanization. In 1985, 16.5 million rubles worth of implements and small-scale mechanization means will be delivered for personal subsidiary farms. The assortment of these goods is planned to be expanded to 80 descriptions, that is, twice the current assortment. Electrified straw-cutters, electric household pumps, feed grinders and mixers, equipment for caring for sheep and cattle, and water-raising equipment are envisioned to be developed.

Fulfillment of the tasks placed before the machine builders for realization of the Food Program is being ensured on the basis of advanced methods of economic operations and efficient use of production capacities and labor and material resources. The main directions of the sector's development are intensification of production, accomplished on the basis of its technical re-equipment, increasing efficiency and quality of work and an orientation on final national economic results. In improvement of the planning and economic activities of enterprises and organizations, of great importance is the realization of the basic provisions of the resolution of the CPSU Central Committee and the USSR Council of Ministers "On improving planning and strengthening the effect of the economic mechanism on increasing efficiency of production and quality of work".

Since 1981 the sector has been working on the basis of cost accounting principles of planning and financing. Introduction of the realization volume indicator with regard to fulfillment of the delivery plan helps orient enterprises toward more complete fulfillment of equipment requirements of agriculture. Improvement of norm setting and organization of labor, having a direct effect on increasing its productivity, has become a subject of special attention. For this purpose a calculated labor-intensiveness has been established for 163 products, and for 26 products it has already been achieved. Planned goals for the annual review of output norms have been completed. This has made it possible to increase the share of technically sound norms to 76.4 percent. The number of workers not meeting output norms has decreased to 1.4 percent. The brigade method of labor organization is being developed further. Presently about 60 percent of the workers are covered by it.

A conversion of enterprises to the normative method of profit distribution has been accomplished for introduction of the cost accounting system of economic operation. In order to strengthen the incentive role of wages, the ministry has gone to the normative method of its planning which calls for a leading increase of labor productivity in comparison to wage. In 1983, throughout the sector for a 1 percent increase in labor productivity, the growth of the average wage was 0.07 percent under a plan of 0.11 percent.

The work done on improving the economic mechanism has yielded positive results. The growth of labor productivity at enterprises of the sector during 3 years of the current five-year plan was 24.1 percent.

Increasing production efficiency is based primarily on the equipment and modernization of operating enterprises, specialization, concentration and automation, and expanding the introduction of advanced production processes, especially resource-saving processes. Compared to 1975, the value of the sector's industrial-production assets have increased 2.5-fold. In addition, the stock of special machine tools at the enterprises more than tripled and standard-unit machine tools increased 2.5-fold.

Today, 77 enterprises are being re-equipped. Advanced types of specialization are being introduced: part-product and process specialization. The overall volume of production output at specialized plants will more than double by 1985.

Full mechanization and automation of production on the basis of widespread use of automatic manipulators (industrial robots) is one of the most important directions of the sector's scientific and technical progress, providing an increase in labor productivity with a simultaneous reduction in the number of workers. A comprehensive target-oriented program for robotizing manual labor processes has been developed and is being realized. It involves primarily heavy and hazardous work conditions.

Today robots are used for mechanization of cold-forging production at the Gomsel'mash, Nezhinsel'mash, Belotserkovskiy sel'khoz mashin imeni 1 May and the Pyatigorsk sel'mash plants. Work is being done on introducing automatic manipulators for painting flat products at the Gomsel'mash Plant. At a number of enterprises balanced manipulators are being introduced for mechanizing loading and unloading operations.

A considerable amount of work is being done in the sector for increasing the technical level of production which will substantially improve the manufacturing quality of machinery and equipment. Over 406 automatic, semi-automatic and mechanized flow lines, 3,500 automatic and semiautomatic machines, 790 standard-unit and special machine tools and over 1,800 units of mechanization and automation equipment are being introduced in the current five-year plan. This will make it possible to increase the percentage of worker coverage by mechanized labor from 56.5 to 63.5 percent. The increase in labor productivity by increasing the technical level of production will be 24.5 percent.

The task being posed is not only to raise the proportion of advanced equipment sharply by reducing the number of machine tools with manual control, but also to bring about the introduction of flexible, readjustable automatic lines, and special and standard-unit machine tools which will make it possible to switch to production of new equipment more rapidly. The system of controlling output quality continues to be improved at the sector's enterprises. Development of the production base has made it possible to improve substantially the technical level and quality of produced machinery. According to the evaluation of a scientific and technical commission of the USSR State Committee for Science and Technology, in 1983 the amount of machinery conforming to the best domestic and foreign achievements increased to 69.3 percent, compared to 63 percent in 1980. High and constant quality production was achieved by the Radvilishksel'mash, Orsel'mash, Mozyr'ptitsemash and Ufasel'mash plants, which produced over 90 percent of their output with the state Mark of Quality.

Socialist competition is an important mobilizing factor in ensuring practical realization of the party's directions for increasing production efficiency of all links of the agro-industrial complex.

At the end of 1983, the leading labor collectives took the initiative to spread All-Union Socialist Competition for increasing service life of agricultural machinery by at least one year and improving its maintenance, quality of repair, operation and storage under the motto "For every machine--a high technical level, excellent quality, professional servicing and efficient utilization". For the Ministry of Machine Building for Animal Husbandry and Fodder Production (Minzhivmash) these included the Bobruyskfermmash Production Association, the Main Special Planning and Design Buro for Machinery Complexes for Cattle (the State Special Design Buro in Riga), and the Rezekne Milking Machine Plant. For the Ministry of Tractor and Agricultural Machine Building (Minsel'khoz mash) they were the Minsk Tractor Plant imeni V. I. Lenin Production Association, the Krasnoyarsk Association for Grain Harvesting Combines and the Dnepropetrovsk Association of the Combine Plant imeni K. Ye. Voroshilov. For the USSR Ministry of Agriculture (Minsel'khoz) they were the Politotdel Kolkhoz of Tashkent Oblast, the Druzhba Narodov Kolkhoz of Crimean Oblast, the Gigant Sovkhoz of Rostov Oblast, the Kaskelenskiy Sovkhoz of Alma-Ata Oblast and the Detskosel'skoe Association of Leningrad Oblast. Those of the USSR State Committee for Supply of Production Equipment for Agriculture (Goskomsel'khoz tekhnika) included the Rechitskaya Rayon Agricultural Equipment Association (RAEA) of Gomel Oblast, the Klinskaya RAEA of Moscow Oblast, the Sal'skaya RAEA of Rostov Oblast, the Goloprstan'skaya RAEA of Kherson Oblast and the Yelgavskaya RAEA of the Latvian SSR.

Associates of the Minzhivmash, Minsel'khoz mash, USSR Minsel'khoz and the USSR Goskomsel'khoz tekhnika and Central Committee presidiums of the Motor Vehicle, Tractor and Agricultural Machine Building Workers' Trade Union and of the Agricultural Workers' Trade Union examined and approved of the initiative of the leading collectives and their socialist commitments.

The socialist commitments of the leading labor collectives of the Minzhivmash, Minsel'khoz mash and the USSR Goskomsel'khoz tekhnika are aimed at increasing

the quality of equipment, accelerating the introduction of advanced solutions into machinery designs for increasing the reliability and durability of machinery and equipment, lowering labor-intensiveness of maintaining them by 10-15 percent by 1986, as well as a guaranteed supply of areas served with spare parts, units and assemblies of the exchange fund and full satisfaction of the needs of kolkhozes and sovkhozes in all types of repair and maintenance of agricultural equipment to ensure its trouble-free operation.

Leading collectives of kolkhozes and sovkhozes of the USSR Ministry of Agriculture have taken upon themselves commitments to organize exemplary storage and maintenance of machinery and equipment, systematically conduct retraining of machine operators and increase the proportion of Category I and II machine operators to at least 75-80 percent by 1985.

The initiative of the collectives of the leading enterprises and organizations of the ministries and departments of the agro-industrial complex, bound together by the common character of fulfilling the Food Program, is in response to the decisions of the 26th Party Congress and subsequent CPSU Central Committee plenums for further increasing the efficiency of agricultural production.

There is no doubt that this initiative will find broad dissemination and support in other collectives of enterprises and organizations of the agro-industrial complex which have actively joined in the socialist competition for increasing service life of agricultural machinery and improving its maintenance, quality of repair, operation and storage of equipment, by increasing their contribution to realization of the Food Program.

The workers of the sector deeply welcomed the decisions of the February (1984) CPSU Central Committee Plenum. Having spread the socialist competition widely, they are fully resolved to fulfill successfully the tasks of 1984 and of the 11th Five-Year Plan as a whole.

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IMPROVEMENTS IN TECHNICAL SERVICES FOR AGROINDUSTRIAL COMPLEX

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/Article by L. Khitrin, chairman of USSR Goskomsel'khoztekhnika: "Improvements in Production-Technical Servicing of the Agroindustrial Complex"/

/Text/ In solving the large-scale socio-economic tasks, the Communist Party is persistently and purposefully carrying out the agrarian program directed towards achieving the planned and dynamic development of agriculture and the country's entire agroindustrial complex, increasing the production and raising the quality of the agricultural products and improving the economic effectiveness of all branches of the APK /agroindustrial complex/. In the decree handed down during the December (1983) Plenum of the CPSU Central Committee, special emphasis is placed upon the need for intensifying the efforts of workers attached to the agroindustrial complex, with regard to carrying out the USSR Food Program and raising the cropping power of the fields and the productivity of animal husbandry.

The enterprises and organizations of the USSR State Committee for the Production-Technical Servicing of Agriculture must play an important role in carrying out this great and many-sided work.

In implementing the decisions handed down during the 26th party congress and subsequent plenums of the CPSU Central Committee, the labor collectives of enterprises and organizations of USSR Goskomsel'khoztekhnika are directing their energies towards creating the conditions required by the kolkhozes and sovkhozes in order to further raise labor productivity, achieve efficient operation of the machine-tractor pool, raise the productivity of the fields and farms and achieve high final results in agricultural production. All work being performed by workers attached to the USSR Goskomsel'khoztekhnika system is being subordinated to solving these tasks.

The accelerated development of the economy, the technical re-equipping of agriculture and the related need for a further division of social labor and for intensifying production specialization are bringing about a steady and planned strengthening of Goskomsel'khoztekhnika as a leading element of the agroindustrial complex and one which is exerting a substantial influence on improving the efficiency of farming and animal husbandry. In connection with the consistent and comprehensive industrialization of agriculture, the importance of engineering support for the rural areas is increasing with each

passing year. Under these conditions, the collectives of enterprises and organizations in the system must carry out their work in a more energetic manner in the interest of accelerating technical progress in the rural areas, making more efficient use of effective forms for utilizing the machine-tractor pool, improving technical services for the pool and improving the organization of logistical supply, installation, start-up and adjustment, transport and other types of activity.

A chief concern in the all-round program for further developing agriculture -- raising the efficiency of kolkhoz and sovkhoz production and other branches of the APK, based upon strengthening their logistical base, achieving maximum mechanization and electrification and introducing scientific and engineering achievements into operations. As a result of the successful implementation of the party's program for the technical re-equipping of agriculture, its production potential has been strengthened considerably. For example, compared to 1965 the deliveries of equipment for field crop husbandry at the present time have increased by a factor of more than 2.5, for animal husbandry -- by a factor of six, the power engineering capabilities have increased threefold and have reached almost 700 million horsepower and the power-worker ratio is in the area of 30 horsepower per worker.

In conformity with the Food Program, during the 11th and 12th five-year plans agriculture will be supplied with 3,740,000 - 3,780,000 tractors, 1,170,000 grain harvesting combines and 67-70 billion rubles worth of other agricultural machines. A priority task is that of completing, for the most part prior to 1990, the all-round mechanization of farming and animal husbandry and re-equipping the branches of the food industry on a new technical basis.

The principal trends for technical progress in agriculture are reflected in the system of machines for the 1981-1990 period. During the 11th Five-Year Plan, the system calls for an increase in technical equipment by almost 700 items and overall it includes more than 3,600 different machines and mechanisms. Compared to 1983 when slightly more than 2,000 items were produced, by 1990, 1,600 additional new types of machines will have been created, or two times more than during the preceding decade. Production operations will be ensured for new, modernized and powerful tractors, highly productive grain harvesting combines, other self-propelled machines of various types, precision drills, wide-cut units, a new generation of anti-erosion equipment and also a set of machines required for employing industrial technologies in the cultivation of corn, sugar beets, potatoes, vegetables and other crops.

The tempo for converting animal husbandry and potato production over to an industrial basis is being raised. Seventy technological processes which are presently being carried out manually will be mechanized in this branch. For the very first time, the system of machines for animal husbandry includes 130 items for equipment kits, flow lines and technical equipment for new technological solutions. A requirement exists for developing the production of machines and mechanisms included in technological complexes for the procurement, preparation and issuing of feed and for the mechanization of production processes at farms and complexes.

It bears mentioning that modern agriculture does not require a simple increase in technical equipment, but rather the creation of a system of machines which would ensure flow line operations and the complete carrying out of all

agricultural operations during the best agrotechnical periods and the complete replacement of manual labor in farming and animal husbandry. Thus the machines used for carrying out individual operations will be replaced by large numbers of complex flow-technological lines, which will ensure complete mechanization and which will make it possible to change radically the production technology for agricultural products.

The implementation of the system of machines called for during the 1981-1990 period will make it possible to raise labor productivity in field crop husbandry by a factor of 1.5 and in animal husbandry -- by more than twofold. This will make it possible, based upon the labor productivity level achieved at the present time, to release no less than 1 million service personnel for other work on the farms and complexes. A savings of more than 4 billion man-hours annually will be realized in agriculture as a whole and this is equivalent to the year-round release of almost 3 million workers.

USSR Goskomsel'khoztekhnika is carrying out a complex of organizational-technical measures aimed at accelerating technical progress in the rural areas, developing mechanization and the electrification of agricultural production and publicizing and introducing new equipment and industrial technologies into production operations. The most important trends in this work are: participation in developing the agricultural zooveterinary requirements for new machines and composing scientifically sound orders for mechanisms and equipment for agriculture; ensuring control over the carrying out of these orders; organizing state, preliminary and control testing of the equipment; the acceptance of products at the producing plants, the examination of consumer complaints with regard to the quality of the equipment and undertaking measures aimed at correcting defects; servicing of machines during the warranty period; instructing the machine operators and engineering-technical workers of kolkhozes and sovkhozes in the methods for ensuring highly productive use of the new equipment and also in the methods for the leading technology.

In solving these tasks, a special role will be played by the machine-testing stations of USSR Goskomsel'khoztekhnika. The system presently includes 31 MIS /machine-testing station/ and two scientific-research institutes for the testing of tractors, agricultural machines and equipment for livestock farms. All new equipment, including imported equipment, undergoes state testing at these facilities. Here constant control is exercised over serially produced machines. This is making it possible to evaluate their quality and technical level objectively and on an inter-departmental basis. The following figures allow one to make a judgment regarding the volume of such work. In 1983, tests were carried out on 500 types of new machines, 880 serially produced machines and on 180 machines of foreign production.

The materials of machine testing stations and the data obtained from state testing stations provide the base upon which Goskomsel'khoztekhnika is able to determine the demand for and the formation of orders for new equipment and also for publicizing technical progress. This is a barrier which protects agriculture from being supplied with low quality machines. In addition, improvements take place here both in the equipment itself and in the technology employed in the cultivation of many agricultural crops, in conformity with the zonal peculiarities for their cultivation. An MIS is assigned the task of

In the case of further production of obsolete equipment, the plans call for a considerable reduction in the wholesale prices of industry and in the wholesale factory prices for agriculture.

Scientific-technical progress is making it possible to create favorable conditions for highly productive work out on the fields and farms and for further increasing the production of agricultural products. However, in order to take advantage of these opportunities it is necessary first of all to achieve efficient utilization of the machine-tractor pool and farm equipment, ensure that they are operated in a skilful manner and maintained in a high state of technical readiness and ensure timely and high quality servicing and repair work and the efficient organization of mechanized, transport and other operations.

The solving of these tasks, together with the kolkhozes and sovkhoses, involves active participation by the enterprises and organizations of USSR Goskomsel'khoztekhnika, which is responsible for providing engineering and technical services for agriculture. The system's fixed capital presently exceeds 15 billion rubles and there are 7,300 enterprises and organizations in operation, including more than 3,500 rayon associations and departments, almost 400 repair plants, more than 1,600 construction-installation organizations, approximately 500 independent transport establishments and 370 organizations for logistical supply and completion work. There are more than 1.7 million individuals working for Goskomsel'khoztekhnika. The overall production volume exceeds 11 billion rubles and logistical supply -- 23 billion rubles worth annually.

The most important functions of Goskomsel'khoztekhnika have been and continue to be the repair and technical servicing of the machine-tractor pool, farm and other equipment of kolkhozes and sovkhoses, supplying them with logistical means, work concerned with the mechanization of livestock facilities, transporting of freight, production and installation of hothouses and carrying out various services for agriculture and other branches of the APK.

In connection with the diverse work carried out within the system, a special role is played by the organization of repair work and the technical servicing of the machine-tractor pool. The technical equipping of agriculture has reached a level wherein the timely and high quality restoration of the working capacity of machines and equipment is considered to be of decisive importance with regard to raising the degree of mechanization of agricultural production. In other words -- more equipment demands greater concern for the tending of this equipment. Thus, despite a stable trend towards a reduction in specific expenditures for equipment maintenance, the expenses for the repair and technical servicing of the machine-tractor pool now amount to almost 19 percent of its balance value, or approximately 6 billion rubles annually. Thus the creation of a modern and well equipped repair-service base for the APK is of great importance for obtaining high final results in agricultural production.

At the present time, capital repairs are being carried out at enterprises within the system, for kolkhozes and sovkhoses, on more than 70 percent of the tractors, more than one half of the motor vehicles, 62 percent of the grain harvesting combines and on 90 percent of the engines. Taking into account current repairs being carried out for agriculture at plants and workshops of Goskomsel'khoztekhnika, restoration work is being carried out annually on 750,000 tractors,

approximately 160,000 grain harvesting combines, 1,150,000 tractor-combine engines and almost 1 million motor vehicle engines and on a large number of units and assemblies. In addition, capital repairs are being carried out on more than 270,000 motor vehicles and technical services are being provided for more than 500,000 motor vehicles.

Based upon the modern requirements for organizing the repair of agricultural equipment and especially taking into account the advantages of division of labor, the following trends for further development of the repair and service base for agriculture have been developed. Future plans call for the capital repair of machines, units and assemblies to be concentrated completely at specialized enterprises of Goskomsel'khoztekhnika and current repairs and technical servicing -- at kolkhozes and sovkhoses, at general purpose workshops and at stations for the technical servicing of rayon associations within the system. In turn, future plans call for current repairs on the farms to consist mainly of replacing units and assemblies which have broken down with new or restored ones.

This constitutes the assembly method of repair, which is being introduced into operations on an ever increasing scale. A component part of this method is the use of technical exchange points. They issue restored units and assemblies to the kolkhozes and sovkhoses in exchange for worn out elements, with a payment being made for the cost of the repair work. This is a very advantageous arrangement for the farms. By obtaining restored units and assemblies, they realize an average savings of up to 40 rubles. Almost 60 percent of the units and assemblies are now being issued on the day for turning over the repair fund. The recommendation has been made at many exchange points to turn over not only restored units and assemblies but also repaired machines as replacements for units that have broken down. And this convenient type of service is constantly increasing in scope. Compared to 1972, when the volume of operations carried out at technical exchange points was valued at 200 million rubles, by 1983 this figure had increased to more than 1.4 billion rubles. Taking into account the wishes of many RAPO's [rayon agroindustrial association], the enterprises of Goskomsel'khoztekhnika are planning to expand still further the assembly method of repair. It makes it possible, with the same capital expenditures, to achieve a greater volume of work and output production, to lower production costs and to raise the quality of the work considerably.

At specialized enterprises of Goskomsel'khoztekhnika, use is being made of high-precision and highly productive equipment, a more improved technology and modern diagnostics equipment. In addition, skilled personnel are being employed and the achievements of scientific-technical progress are being introduced into operations in a more rapid manner. For example, the complete repair and servicing of K-700 type tractors requires the use of more than 280 units of modern equipment and rigging. By no means are all of the kolkhozes or sovkhoses capable of acquiring such a set of machine tools or equipment, nor are they able to disperse such costly and deficit equipment in a thrifty manner, equipment which for a large portion of time will remain inactive at a farm owing to a shortage of work.

According to data supplied by the Institute of Economics of the USSR Academy of Sciences for the 1972-1979 period, the cost for carrying out capital repairs

on one motor vehicle at enterprises of Goskomsel'khoztekhnika was lower than that at kolkhozes and sovkhoses by 163-180 rubles, a grain harvesting combine -- by 48-57 rubles. This is the result of more thorough specialization in the carrying out of repair work in the system. Computations have shown that an increase in its level of concentration of only 10 percent makes it possible to increase the output-capital ratio at repair enterprises by an average of 7.5 percent, to lower the production costs by 3 percent and to raise labor productivity by 7 percent.

Goskomsel'khoztekhnika is adhering to this trend -- specialization and optimum concentration -- when organizing technical servicing for the machine-tractor pool. An inspection carried out in 125 rayons has shown that when the raysel'khoztekhnika's participate in the technical servicing of the machine-tractor pool, the daily output per standard tractor on the farms is raised by 19 percent, the specific expenditures for the technical servicing and repair work are lowered by 13 percent, the technical readiness of the tractors during tense work periods increased by 5 percent and diesel fuel consumption per hectare fell by 16 percent.

Special importance is being attached to providing centralized technical servicing for the powerful K-700 and T-150 type tractors. These machines differ in terms of their structural complexity, their great weight and the dimensions of their units and parts and also their high labor-intensiveness for the carrying out of dismantling-assembly and adjustment operations. Thus many farms find themselves unable to service such complicated machines using their own resources. Today there are approximately 1,200 technical servicing stations and points within the system. They provide servicing for more than 200,000 powerful tractors. The technical readiness of tractors serviced on a centralized basis during tense periods of work reaches 92 percent, the output increases by 10-15 percent and a reduction takes place in the expenditures required for maintaining them in working condition. The plans call for approximately 260,000 powerful tractors, or 90 percent of their pool in agriculture, to be receiving centralized servicing by the end of this current five-year plan.

Using Zernogradskiy Rayon in Rostov Oblast, Krasnokutskiy Rayon in Saratov Oblast and Predgornyy Rayon in Stavropol Kray as examples, the effectiveness of centralized technical servicing (TO) and current repair work (TR) for K-700 type tractors is characterized by the following indicators:

	With Servicing on the Farms	With Centralized Servicing
Coefficient of readiness	0.70-0.86	0.93-0.97
Annual specific expenditures for TO and TR, rubles per motor hour	1.52	1.27
Average annual accrued working time, in motor hours	1014	1376
Duration of servicing TO-3, in hours	19.5	11.8
Specific labor-intensiveness for correcting break-downs, man-hours per motor hour	0.133	0.06
Average annual duration of tractors undergoing current repair work, in hours	308	168

Compared to 1975, the capabilities of Goskomsel'khoshtekhnika enterprises for repairing K-700 tractors have increased by almost twofold and technical servicing stations -- by a factor of three. Nevertheless, the existing repair-servicing base for such machines is not satisfying the agricultural requirements. For example, technical servicing is being provided for only 25-30 percent of the K-700 tractors in Kuybyshev, Voronezh and Kursk oblasts. And in some oblasts in the Kazakh SSR, there is a general absence of enterprises capable of providing complete repairs for such machines. The plans call for the placing in operation, prior to the end of this current five-year plan, of additional capabilities at specialized enterprises for the carrying out of almost 6,000 repair operations and also technical servicing stations for 63,000 tractors of the K-700 type. This will make it possible to satisfy for the most part the agricultural requirements.

The technical servicing of motor vehicles is developing along the same lines. The operational experience of specialized stations convincingly confirms their high effectiveness. Analysis has shown that they ensure an increase of 10 percent in the technical readiness of motor vehicles, an increase of 3,000-4,000 kilometers in the average annual run and a reduction in expenditures of 100-110 rubles per motor vehicle for technical servicing and current repairs. The total amount of expenditures required per motor vehicle for creating a centralized base for technical servicing is 800 rubles less than that required for decentralized servicing. The requirements for machine tool equipment have decreased considerably. However the introduction on an extensive scale of specialized servicing for the motor vehicle pool is being held up as a result of an inadequate production base. The plans call for servicing to be provided for 570,000 motor vehicles now operating in the rural areas prior to the end of this current five-year period. This will be accomplished by means of additional construction and the modernization of stations.

Improvements in the quality of the repair work will provide large reserves for ensuring highly efficient use of the machine-tractor pool of kolkhozes and sovkhozes and for the carrying out of agricultural operations during the best agrotechnical periods. Within the Goskomsel'khoshtekhnika system, a considerable increase has taken place in recent years in the release from capital repair work of tractors having a raised service life -- from 70,000 to 330,000 and tractor-combine engines -- from 227,000 to 887,000 annually. In 1983 their proportion compared to the overall volume of capital repair work amounted to 72 and 80 percent respectively. The all-round system for controlling the quality of the repair work is now being introduced into operations on a more extensive scale. Today it is in operation at almost 1,000 enterprises and by the end of the 11th Five-Year Plan it will have been introduced at 500 more plants and workshops.

The system of branch certification of equipment that has been repaired will undergo further development. By the end of the five-year plan, the proportion of certified repair work, compared to the overall volume of tractor repair work and engine repair, will reach 80 percent. As a result of measures undertaken, the post-repair warranty period for engines, for example, increased by 1,000-1,500 motor hours. However, shortcomings continue to persist as do also the complaints of farms with regard to the quality of the repair work. In the interest of improving the status of affairs, an all-round special purpose program was developed for improving the quality of the repair work, a program

which calls for the introduction at repair enterprises of progressive technologies, diagnostic equipment and improvements in the system of control and metrological support. A large portion of the capital investments allocated for development of the repair base is being used for the technical re-equipping of enterprises and for expanding existing capabilities. An increase is taking place in material responsibility for low quality work.

Purposeful work is being carried out directed towards mechanizing labor-intensive processes in animal husbandry and achieving a high level of reliability for the machines and equipment in use on the farms and complexes. During just 3 years of the 11th Five-Year Plan, specialized services completely mechanized the facilities for 11.2 million cattle, for hogs -- more than 7 million and for poultry -- 88 million. Almost 10,000 new feed preparation shops were placed in operation. Technical servicing has been made available for a large portion of the cattle fattening complexes and for approximately 90 percent of the feed preparation shops. Technical servicing is also available for 94-97 percent of the milking and refrigeration equipment on the farms. In addition to other measures, this enabled the country's farms to raise the sale of 1st grade milk to 80 percent.

The service for installation and start-up and adjustment and for the technical servicing and repair of equipment at livestock farms is developing in a dynamic manner. In 1983 the overall volume of this work exceeded 2 billion rubles. The structure of this service includes more than 40 associations of Sel'khozmontazhkomplekt, 64 installation trusts, more than 1,100 PMK /mobile mechanized column/ and start-up and adjustment administrations, 140 completion offices, 325 procurement enterprises and haylage combines, 300 departments for the repair of farm equipment, two scientific-research institutes, three orgtreasts and more than 120 planning organizations. During the 1981-1985 period, the plans called for the services to carry out more than 8 billion rubles worth of installation, start-up and adjustment, technical servicing and repair work. In addition, they must completely mechanize the facilities for maintaining 21 million cattle, 12 million hogs and 146 million birds.

Another important sector in the production activity of Goskomsel'khoztekhnika -- transport services for agriculture. The principal form for organizing the work -- centralized transport operations, the proportion of which has reached 82 percent. Roughly 16 percent of all trucks being used in agriculture throughout the country belong to Goskomsel'khoztekhnika and yet they carried out 20 percent of the transport work volume and 32 percent of the freight turnover in the rural areas. The system's avtotransport transported more than 825 million tons of freight, of which amount 85 percent was intended for enterprises and organizations of the agroindustrial complex. Each year, more than 130,000 of the system's motor vehicle participate in harvesting the crops in the form of motor vehicle columns.

Experience has shown that the carrying out of transport operations using the centralized method serves to ensure the efficient utilization of the motor vehicle pool and labor resources and improvements in all of the indicators. The introduction of this form of transport service makes it possible each year to release 60,000 drivers, loaders and expeditors of kolkhozes and sovkhazes, who earlier were engaged in delivering freight from the supply bases of Sel'khoztekhnika. The conversion over to the centralized delivery to the farms of all freight from supply bases, railroad stations and piers will be

completed during the 11th Five-Year Plan. The indicators for 1982, cited below, allow one to make a judgment regarding the high operational effectiveness of the system's motor transport service, as a result of employing the centralized delivery of freight.

	In All Agriculture	At Kolkhozes	At Sovkhozes	In Goskom- sel'khoztekhnika
Expenditures (man-hours) for shipments:				
1,000 tons of freight	613	673	612	552
1,000 ton-kilometers	24.1	35.7	31.8	12.1
Gasoline consumption, grams per ton-kilometer	143	170	171	97
Production cost for 10 ton-kilometers, rubles	0.78	1.06	0.96	0.60
Coefficient of use: carrying capacity	1.01	0.80	0.90	1.17
run	0.50	0.48	0.78	0.59

With the creation of RAPO's rayon agroindustrial association, more favorable conditions became available for further developing the centralized methods for delivering freight. As early as 1982, methods for the centralized control over motor vehicle shipments were being employed in all areas, regardless of the departmental affiliation of the transport equipment. During the crop harvesting period, operational control centers were created at the raysel'khoztekhnika's. These centers were responsible for coordinating the work of the motor transport service and also for solving those tasks concerned with ensuring highly productive use of the harvesting, loading-unloading and transport equipment.

* * *

In raising the efficiency of agricultural production, an important role is played by reliable logistical supply. USSR Goskomsel'khoztekhnika supplies equipment, materials and diverse types of goods to almost 48,000 kolkhozes and sovkhozes and 20,000 other agricultural enterprises and organizations. It supplies spare parts for enterprises and organizations of all branches of the national economy. The list of logistical supplies being supplied exceeds 200,000 items and they are being produced by 9,000 industrial enterprises. In addition, the special service of Goskomsel'khoztekhnika carries out the equipping process for more than 120,000 livestock complexes, poultry factories, farms and other installations which are under construction or being modernized, at a cost of 1.8 billion rubles annually.

It is not enough to merely supply the kolkhozes and sovkhozes with the ordered machines and equipment on a timely basis. They must also be completed and checked for quality. Thus, more than 70 percent of the agricultural machines are shipped by the supplier-plants in dismantled or semi-dismantled form. By way of furnishing assistance to the kolkhozes and sovkhozes, the enterprises and organizations of Sel'khoztekhnika have assumed responsibility for the assembly, adjustment and running-in of machines being received from industrial

enterprises. There are now more than 1,600 departments and sectors for the assembly of equipment in operation at the system's supply bases. During a year's time, approximately 1,200,000 machines, or one third of all machines being delivered to agriculture, are being assembled here. This form of pre-sale servicing will undergo further development. The economic effect being realized by the kolkhozes and sovkhozes as a result of the centralized assembly of agricultural machines (according to accounting data) amounts to an average of 8-10 rubles per machine. The complete conversion over to such assembly work will make it possible to release more than 30,000 machine operators for other work and produce an annual savings of not less than 40 million rubles.

In order to improve control over supply operations in Goskomsel'khoztekhnika, a greater amount of attention has been given recently to the introduction of an ASU /automatic control system/. There are now 118 information-computer centers functioning within the system and they are equipped with almost 200 EVM's /electronic computer/. More than 2,000 points for the initial processing of information and more than 3,300 dispatcher points for solving operational control tasks are in operation. A component part of the ASU for logistical supply for agriculture is an information retrieval system for spare parts supplies and deliveries, which is already being employed in more than 30 oblast associations. For example, the conversion over to an automatic control system, in addition to other measures, made it possible for Goskomsel'khoztekhnika in the Belorussian SSR to lower the volume of orders for units and parts for agricultural machines by 25 percent during the past 4 years, including for tractors by 10 million rubles, with growth in the technical readiness of the machine-tractor pool up to 95 percent. This made it possible for Belorussia, in 1984, to lower the orders for spare parts by 8 million rubles compared to the norm.

One additional source for increasing the spare parts resources is that of restoring worn out parts. Studies have shown that on the average 20-45 percent of the parts of tractors designated for capital repair work are fully suitable for further operation, 20 percent are rejected completely as a result of breakdowns or excessive wear and 30-50 percent of the parts can still be used for one more season, provided their initial parameters are restored. The use of modern technologies is making it possible to restore parts such that their quality is as good as that of new parts. The production cost in such instances amounts to 60-70 percent of that for new items. The repeated use of parts following the expiration of their normal service life will produce a savings for the national economy amounting to almost 2,000 tons of rolled metal. In 1983 the enterprises of USSR Goskomsel'khoztekhnika restored worn out parts valued at almost 500 million rubles and this was equivalent to deliveries of new spare parts valued at roughly 800 million rubles. These volumes will be increased considerably in the future.

The chief trends for developing this branch -- the creation of specialized enterprises, departments and sections, equipping them with highly accurate and highly productive equipment and the extensive use of very modern and effective methods for restoring worn out parts. This includes first of all gas-plasma and plasma spraying of worn out metal powdery materials, laser surfacing and many others. The solving of this problem is based upon the use of modern science and leading practice. The Board of USSR Goskomsel'khoztekhnika and the

Presidium of the USSR Academy of Sciences have adopted a joint decree which outlines specific measures for utilizing scientific-technical progress in connection with the restoration of worn out parts.

During the December (1983) Plenum of the CPSU Central Committee, an important task was advanced -- in all branches of the national economy, to achieve an above-plan increase in labor productivity of 1 percent and to lower production costs by an additional 0.5 percent. The carrying out of this party task as part of the 1984 plan will on the whole make it possible for Goskomsel'khoztekhnika to lower the production costs for output, work and services by 50 million rubles and to increase their volume by 110 million rubles. At the present time, a competition which has been launched among enterprises and organizations within the system is directed towards achieving these results.

This is being promoted by consistent and purposeful work aimed at further improving control and ensuring that its forms are in keeping with the modern managerial conditions.

Following the May (1982) Plenum of the CPSU Central Committee, approximately 650 organizations in USSR Goskomsel'khoztekhnika were abolished and the number of staff workers was reduced by 32,000, or by almost 10 percent. Certain basic changes were introduced into the structure of the union committee and its organs in the various areas. In particular, in the interest of improving inter-branch relationships between Goskomsel'khoztekhnika on the one hand and kolkhozes, sovkhoses and other enterprises of the APK on the other, a new main administration was created for the purpose of organizing services for the agroindustrial complex. A general plan was developed for administering the enterprises and organizations. A maximum amount of attention was given to strengthening further the principal production element of the system -- the rayon associations, the role and importance of which have increased considerably owing to the creation of the RAPO's, since their repair workshops, technical servicing stations, exchange points and other production subunits are directly associated with the activities of the farms and influence substantially the final results of their activities.

In order to increase the interest of workers, enterprises and organizations belonging to the Sel'khoztekhnika System in raising the efficiency of kolkhoz and sovkhos production, a new standard statute was approved on the issuing of bonuses to workers, leaders, engineering-technical workers, other specialists and employees of rayon (inter-rayon) associations and departments concerned with providing production-technical support for agriculture. Today the size of the incentives issued to workers who are directly associated with furnishing services for the kolkhozes and sovkhoses is directly dependent upon the output of the farms serviced. Thus, if an improvement is noted in the weight increases at a livestock complex, then the brigade of machinists that serviced the farm equipment is paid a bonus from the funds of the rayon association of Sel'khoztekhnika.

The leaders, engineering-technical workers and other specialists attached to the rayon associations and departments of Sel'khoztekhnika are issued incentives based upon the annual results, for each percent of increase in the production of agricultural products obtained at the kolkhozes and sovkhoses

served, compared to the average annual level achieved over the preceding 5 years -- up to 2 percent of the annual wage in accordance with the official salaries. This category of worker is awarded a bonus in the same amount for each percent of profit or net income obtained at the farms serviced, compared to the average annual level achieved during the preceding 5 years. If all of the farms serviced fulfill their plans for increasing agricultural production, then the bonuses computed for increased production output and profit are increased by 30 percent. The bonuses are lowered in those instances when the plans for procuring coarse and succulent feed and other conditions are not carried out.

Earlier one half of the above-plan profit of rayon associations was allocated to the budget. Today it is being turned over to the kolkhozes, sovkhoses and other agricultural enterprises and organizations proportional to the value of the work carried out. The remaining 50 percent remains at the disposal of the raysel'khoztekhnika. It bears mentioning that roughly one half of the profit obtained by Goskomsel'khoztekhnika is formed not as a result of services performed for the kolkhozes and sovkhoses, but rather as a result of work paid for by Minpishcheprom /Ministry of the Food Industry/ for the transporting of sugar beets, Minzag /Ministry of Procurements/ for the delivery of grain and Minsel'stroy /Ministry of Rural Construction/ for subcontracted installation work. The rates for the majority of types of services provided for kolkhozes and sovkhoses, similar to the price mark-ups for logistical resources released, have remained constant for many years and some have even decreased, despite an increase in the prices for materials and spare parts. In 1982 the profitability level for supply activity by USSR Goskomsel'khoztekhnika amounted to only 3.2 percent, raysel'khoztekhnika -- 5.9, motor transport operations -- 2.2 and technical servicing of the machine-tractor pool -- 1 percent. These figures provide a clear picture of the profitability of Sel'khoztekhnika, confirming once again that the system's profitability is the lowest when compared against other ministries and departments included in the APK. In this regard, the statements made by the authors of many publications concerning the excessive profitability of enterprises and organizations of Goskomsel'khoztekhnika sound very strange indeed.

At the present time, the accounts between raysel'khoztekhnika on the one hand and kolkhozes and sovkhoses on the other, for the repair and technical servicing of the machine-tractor pool, are being carried out within the annual limits approved by the RAPO, based upon expenditures which must not exceed the specific actual expenses of a rayon's farm for the mentioned types of service, on the average for the past 3 years and taking into account the planned savings. If their value turns out to be higher, then the total amount of the overexpenditure applies to the operational results of the rayon associations of Sel'khoztekhnika.

The production relationships of kolkhozes, sovkhoses and other agricultural enterprises and organizations with the rayon production associations of Goskomsel'khoztekhnika which provide them with services are developed on a contractual basis which sets forth their mutual responsibility for the timely and high quality fulfillment of work. In conformity with the decree of the CPSU Central Committee and the USSR Council of Ministers entitled "Improvements in Economic Relationships Between Agriculture and Other Branches of the National Economy," USSR Goskomsel'khoztekhnika, jointly with USSR Minsel'khoz and other

interested ministries and departments, developed and approved a new standard agreement and also a statute on the order for concluding and carrying out such an agreement. These documents established a raised level of responsibility of the rayon production associations of Sel'khoztekhnika for violations of the schedules and the quality requirements with regard to the carrying out of the contractual obligations.

Fines have been established today for example not only for a machine breaking down, with Sel'khoztekhnika being at fault. The losses for the idle time of the machine are reimbursed regardless of the duration of the down time. In the case of idle time for tractors, combines and other machines, which arose as a result of the untimely satisfaction of complaints, the system's production associations reimburse the farms for the losses in accordance with the planned value of a machine-day, for the entire period of idle time over and above the established periods.

In order to intensify control, statistical accounting will be introduced based upon indicators which describe the fulfillment of agreements for providing production-technical services for the farms. A new statute has been approved on deliveries of equipment and other logistical resources to kolkhozes, sovkhoses, agricultural enterprises and organizations. The rayon production associations are now concluding delivery agreements with the farms. The order to be followed for delivering the products, taking into account their quality, prices and the accounting method and also the property contractual responsibility of the parties involved are all set forth in this document. For failing to deliver the product or delivering them in violation of the schedules, Goskomsel'khoztekhnika pays the farms a fine amounting to 8 percent of the value of the products. If raysel'khoztekhnika delivers products which are rejected or which do not conform to the standard or technical conditions, or if it delivers products which are not complete, the farm can exact a fine from the association in the amount of 20 percent and for products of the highest quality category -- 30 percent of their value.

The process of improving economic relationships between Sel'khoztekhnika on the one hand and the kolkhozes and sovkhoses on the other is taking place in all spheres of production-technical support for agriculture, at all levels of control and especially directly at enterprises in the system. At the present time, more than 300 rayon associations of Sel'khoztekhnika are successfully employing the new system of accounts for the technical servicing and current repair of animal husbandry equipment. The essence of this system is as follows: specialized services of the system ensure the continuous operation of all of the machines and mechanisms on the farms and at feed preparation shops, and for their part the kolkhozes and sovkhoses pay for their services based not upon the actual volumes of work carried out but rather upon the normative value of the repair and technical servicing work. This form of interrelationship eliminates the interest of rayon associations of Sel'khoztekhnika in carrying out unforeseen operations. Here all attention is concentrated on achieving a high degree of reliability for the farm equipment. In some groups of farms, the Sel'khoztekhnika workers receive additional payments for increasing production or raising the quality of the livestock products.

Special importance is being attached at the present time to creating a single engineering service for the RAPO. Several variants for such a service have already been developed. Thus the Verkhnekhavskiy raysel'khoztekhnika in

Voronezh Oblast has accepted full responsibility for the timeliness and quality of the repair and technical servicing work being carried out on farm machines and equipment and for maintaining the MTP /machine and tractor pool/ in a high state of technical readiness. All of the kolkhozes have leased their workshops and technical servicing points to raysel'khoztekhnika on a contractual basis. The repair workers, expert-trouble shooters and a portion of the engineering-technical personnel have been transferred over to the raysel'khoztekhnika staff.

A single service has been created in the rayon for the repair and technical servicing of the mechanization and electrification equipment at kolkhozes and sovkhozes, including animal husbandry and feed production. Seventeen production-technical sections were organized at the leased workshops and technical servicing points of raysel'khoztekhnika, at the kolkhozes and sovkhozes. The experience of the Verkhnekhavskiy raysel'khoztekhnika is being introduced into operations in 20 oblasts, krays and autonomous republics and on more than 700 farms throughout the country. It is being used extensively in Gorkiy, Novgorod, Orel, Belgorod and Ivanovo oblasts and in the North Ossetian and Kabardino-Balkar ASSR's.

A type of engineering service is being developed in the rural areas -- inter-farm enterprises for mechanization. They are being created on a cooperative basis, bringing together the entire machine-tractor pool and the operational-repair base of the kolkhozes, sovkhozes and Sel'khoztekhnika. This form is being used successfully in Stavropol Kray and in Kurgan-Tyube and a number of other oblasts (see the journal EKONOMIKA SEL'SKOGO KHOZYAYSTVA, 1983, No. 8, pp 56-57).

In accordance with a decision handed down by the RAPO, all responsibility for the organization, use, repair and technical servicing of the machine and tractor pool for farms in the rayon has been assigned to the Shargorodskiy raysel'khoztekhnika in Vinnitsa Oblast. Engineer-technologists serve as the link between this association and the kolkhozes and sovkhozes. One farm is assigned to each one of them. The question concerning eliminating the duplication taking place in the duties of an engineer-technologist and the chief engineer at a kolkhoz is under study. By way of an experiment, these duties have been combined at five farms in the rayon, with the obligations of the chief engineer being assigned to an engineer-technologist of raysel'khoztekhnika, with an appropriate increase in pay being authorized. As a result of these and other measures, a noticeable reduction took place in Shargorodskiy Rayon during 1983 in the periods required for carrying out all of the field work. For example, at the kolkhozes imeni Kotsyubinskiy, imeni Petrovskiy, imeni Frunze, imeni Ivan Franko and imeni XXVI Partiynogo S'yezda, the harvesting of the grain crops took place 3-5 days earlier than the previous year. The idle time of tractors caused by technical problems was reduced by 120 tractor-days.

The farms benefit from the centralized technical servicing and repair of equipment at their oil storehouses and oil bases, with use being made of the resources of Goskomsel'khoztekhnika. This form of service is being made available to a large number of agricultural enterprises throughout the country. Its introduction is making it possible to lower gasoline and diesel oil

consumption by 3-5 percent and to realize a savings of approximately 1.5 rubles per ton of oil products.

The extensive introduction into operations of intraorganizational accounting and the brigade contract method is promoting greater interest and responsibility among the system's collectives with regard to achieving high final results. In those areas where the brigade form is being used for organizing and stimulating labor, reductions are taking place in the work periods, labor productivity is higher by an average of 20 percent, the quality of the output is improving, production costs are declining, an atmosphere of mutual exactingness and responsibility is being created and the link between wages and the final results is becoming stronger. Thus, with the introduction of the brigade form for organizing and stimulating labor, labor productivity increased by 27 percent in the repair workshop of the Kozelskiy raysel'khoztekhnika in Kaluga Oblast and the size of the brigade was reduced by 12 workers. There are 57,000 brigades operating at enterprises of USSR Goskomsel'khoztekhnika, with 37,000 operating on the basis of collective contracts. The latter account for approximately half of the workers. During the current five-year plan, the brigade form for organizing and stimulating labor throughout the system will become the principal form.

Spring is in full swing in the southern part of the country and field work will soon commence on a mass scale in all of the other rayons. Goskomsel'khoztekhnika has been assigned the task of ensuring the timely preparation of the machine-tractor pool and its efficient use, in the interest of having the sowing work carried out during the best agrotechnical periods. In response to the decisions handed down during the December (1983) Plenum of the CPSU Central Committee, the collectives of Goskomsel'khoztekhnika enterprises and organizations have launched a socialist competition for further improving engineering-technical services for the kolkhozes and sovkhoses, improving logistical supply, transport, mechanized and other operations and raising the quality of this work, such that together with the farm workers it will be possible to achieve further growth in the cropping power of the fields and in farm productivity and thus obtain high final results in agricultural production.

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AGRICULTURAL MACHINERY AND EQUIPMENT

PROSPECTS FOR DEVELOPMENT OF AGRICULTURAL MACHINERY DISCUSSED

Kishinev SOVETSKAYA MOLDAVIYA in Russian 18 May 84 p 3

[Article by I. Ksenevich, chief of the Technical Administration of the USSR Ministry of Tractor and Agricultural Machine Building: "Tomorrow's Equipment"]

[Text] At a "roundtable" discussion conducted by SOVETSKAYA MOLDAVIYA for production workers at the Yedinetskiy Agro-industrial Complex and for scientists ("Nothing But the Best for the Farmer's Arsenal," Issue No 277 of SOVETSKAYA MOLDAVIYA for 1983), a great amount of attention was given to the quality of agricultural equipment. The farm leaders, specialists and brigade leaders expressed a number of critical comments and wishes with regard to the SKB [special design office] and enterprises engaged in the creation and production of agricultural machines. Those who participated in the "roundtable discussion" expressed interest in the future prospects for agricultural machine building and in the trends for equipment development. These matters are discussed in this article.

The report concerning the "roundtable discussion" conducted by the newspaper SOVETSKAYA MOLDAVIYA in Yedinetskiy Rayon has been studied thoroughly within the USSR Ministry of Tractor and Agricultural Machine Building. The problems raised by those who participated in this discussion are urgent beyond any doubt and warrant the fixed attention of the scientific-research and planning institutes, the SKB and the enterprises engaged in the production of equipment. On the basis of items which have appeared in the newspaper, it would appear that many of the enterprises and SKB's which were subjected to criticism have already undertaken appropriate measures, the carrying out of which will make it possible to eliminate design shortcomings in certain types of machines and improve their quality, reliability and convenience of operations.

What will tomorrow's equipment be like and what are the trends in equipment development?

The vast territory of our country has approximately 20 soil-climatic zones which differ substantially in terms of the average annual amount of precipitation, temperature regime, relief, soil types and other indicators. Such diverse conditions require very diverse types of equipment, capable of

carrying out definite types of agricultural operations under specific climatic conditions.

The "System of machines for the all-round mechanization of agricultural production" which is developed every 5 years, is helping to solve this complicated task. All of the principal and specific requirements with regard to the cultivation and harvesting methods and the post-harvest processing of various agricultural crops are taken into account in this system. For example, for this present five-year plan this "System" numbers more than 1,000 types of technical equipment for the all-round mechanization of agriculture. Moreover, special attention is being given to improving to the maximum possible degree the technical level and the quality and reliability of the machines. Prior to 1990, for example, the plans call for the productivity of the agricultural machines and machine-tractor units to be raised by an average factor of from 1.5 to 1.8.

It bears mentioning that an increase has taken place in recent years in the production of machines having high characteristics with regard to reliability, productivity and other important indicators. Included among them are the DT-75M tractor, the KSKU-6 self-propelled corn harvesting combine, the RKS-6 sugar beet harvesting machine and the self-propelled SPS-4.2 beet loader and cleaning unit.

The scientists and designers are working on machines which will mechanize those operations which are still being carried out manually. Of such machines, the SKT-2 combine is now being produced for the extensive harvesting of tomatoes, the VUM-15 machine for harvesting cherries and a number of others.

On the whole, our program is as follows: by 1985, to complete the all-round mechanization of the production of the more important agricultural products, to apply mineral fertilizers to the soil and to employ plant protective agents and also to raise the level of mechanization for the harvesting of potatoes to 85 percent, cabbage -- to 75, tomatoes -- to 40, carrots, table root crops and onions -- to 80, fruit and grapes -- to 20 percent.

Permit me to discuss briefly the problems of the tractor pool. At the present time, the MTZ-80 is being used as the basis for creating a model with a power rating of 100 horsepower and capable of operating with both attached and semi-attached windrow harvesters. The T-150K tractor is being modernized; its power rating is being raised to 200 horsepower. A new and powerful multiple-purpose row crop tractor is being developed, all of the wheels of which will be driving wheels. It will have a power rating of 150 horsepower and it will be capable of operating with 12-row corn and 18-row beet-harvesting sowing machines and cultivators. The number of wide-swath machines for use with the T-150K and K-701 type tractors is being expanded.

Work is being completed on the creation of grain harvesting combines of the "Don" family of machines. This family includes two basic models -- with a thresher width of 1,500 and 1,200 millimeters. The new combines use a hydro-volume drive for the leading wheels, the capacity of the hoppers and the productivity of the unloading screw conveyers have been increased and the power rating of the engines has been raised to 220-250 horsepower. Cabin conditions have been created for these machines which ensure fine working conditions for the machine operators.

The production of new and highly productive machines for vegetable production, horticulture and viticulture has commenced, including a 4-row self-propelled potato harvesting combine, a 2-row machine for harvesting cabbage, a machine for harvesting carrots and table root crops, mechanized lines for the post-harvest processing of vegetables and fruit and other items of equipment.

In discussing the technical trends in design, it should be emphasized that in addition to raising the productivity and reliability of the machines, the all-round hydraulic fixation and automation of tractors and agricultural machines will undergo further development and more extensive use will be made in the machines of progressive design materials. The number of types of machines employing automatic equipment will increase by more than twofold by 1985.

The urgent tasks of the branches of agricultural machine building were defined during the recent all-union conference on the problems of the agroindustrial complex. This included the accelerated introduction of new equipment into production operations, an intensification in the rates for producing a set of machines for use with powerful tractors and a number of other tasks.

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EFFECTIVENESS, DISTRIBUTION OF VEGETABLE PRODUCTION IN USSR

Moscow IZVESTIYA TIMERYAZEVSKOY SEL'SKOKHOZYAYSTVENNOY AKADEMII in Russian
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[Article by N. Ya. Kovalenko, Department of Agricultural Economics: "The Effectiveness and Distribution of Vegetable Production in the USSR"]

[Text] The USSR Food Program for the period to 1990 indicates an increase in the average annual production of vegetables and melon crops to 33-34 million tons during the 11th Five-Year Plan and to 37-39 million tons during the 12th Five-Year Plan and at the same time to significantly increase the production of vegetables on protected ground. By 1990 it is planned to increase the per capita consumption of vegetables and melon crops to 126-136 kilograms as compared to 97 kilograms in 1980.

Improvements in the supplying of the population with fruit and vegetable products will be implemented by means of a further growth in production, improvements in quality and a decrease in losses. In order to do this, in the future it is planned to increase capital investments in the branch of agricultural machine building and for the building of warehouses, freezers and paved roads.

The volume of vegetable production in all categories of enterprises in the USSR increased by 13 percent in 1976-1980 as compared with 1971-1975, comprising an average per year of 26.0 million tons. During this period the production of vegetables increased by 19.7 percent in kolkhozes, sovkhoses and other state enterprises. In 1981 gross yield of vegetables in the country comprised 27.1 million tons; in 1982--30.0 million tons (5). An increase in the volume of vegetable production is realized primarily by means of a growth in the productivity of vegetable crops, which increased by 12.6 percent during the years of the 10th Five-Year Plan as compared to 1971-1975, comprising 153 quintals per hectare (Table 1).

Of the total volume of vegetables raised in this country in 1980, 24.6 percent were produced by kolkhozes, 41.9 percent by sovkhoses and other state enterprises and 33.5 percent by private plots. Within the production structure of vegetables in kolkhozes the largest proportion is made up of tomatoes (33 percent) and white-headed cabbage (27 percent), in sovkhoses--white-headed cabbage (41 percent) and tomatoes (23 percent), whereas on private plots 45

percent of what is raised consists of green and rare vegetables (pepper, egg-plant, squash, green peas and others).

The sowing area for vegetable crops increased from 1,562,000 hectares in 1976 to 1,715,000 hectares in 1980; in 1981 it comprised 1,703,000 hectares and in 1982--1,715,000 hectares (2).

Table 1
Vegetable Production in USSR (in all categories of enterprises) (5)

Indicator	Average per Year		1981	1982
	1971-1975	1976-1980		
Gross yield, millions of tons	23.0	26.3	27.1	30.0
Productivity, quintals per hectare	138	153	150	165
State procurement, millions of tons	13.1	17.2	17.1	19.4

Over 70 percent of all vegetable crop stands are found in the RSFSR and UkSSR, where 65-67 percent of all vegetables produced in the USSR are raised. Other large producers of vegetables are Uzbekistan and Moldavia, which produce 9.0 and 4.5 percent of total vegetables produced in the country respectively.

In the RSFSR vegetable crops are concentrated primarily in the North Caucasus economic region (29 percent of the entire area occupied by these crops in the republic), in the Transvolga (19 percent) and in the Central (14 percent). During the 10th Five-Year Plan these three economic regions produced over 62 percent of the total volume of vegetables raised in the RSFSR.

Within the structure of sowing areas for vegetable crops in the USSR the largest proportion is made up of white cabbage (24 percent), tomatoes (23 percent) as well as green and rare vegetables (15 percent). Individual regions in the republic differ significantly in the assortment of vegetables raised. In the northern regions there is a predominance of white cabbage, carrots and food beets. In the Baltic republics and in Belorussia 65-70 percent of the area is in these crops, whereas tomatoes, cucumbers and onions-turnips occupy only 8-12 percent of the area.

In the southern republics the proportion of tomatoes, cucumbers, early types of vegetables and onion-turnips is increasing within the crop structure. In the Moldavian, Armenian, Tajik and Azerbaijan union republics tomatoes occupy 45-51 percent of the area, in the Ukrainian SSR cucumbers occupy 17 percent of the area and in the Kirghiz, Uzbek, Turkmen and Tajik union republics onions-turnips occupy 24-27 percent of the area.

In the RSFSR the largest areas in white cabbage, carrots and table beets are concentrated in the Northwest, Central Volga-Vyatsk, Ural, Western Siberia and Eastern Siberia economic regions. The proportion of these crops within the structure of vegetable crops of the given regions comprises 40-56 percent, 14-19 percent and 9-15 percent respectively. In the Transvolga and North Caucasus economic regions there is a predominance of tomatoes (33-35 percent), onions-turnips (12-23 percent) as well as early green vegetables and rare crops such as pepper, eggplant, squash, green peas and so forth. In the Central Chernozem Zone as well as in Eastern Siberia and the Far East there is a large proportion of cucumbers (18-20 percent).

During the 12th Five-Year Plan in the southern regions of the country it is planned to create large specialized enterprises and agro-industrial associations for the production and processing of fruits and vegetables. Southern regions must be transformed into a primary base for supplying the populations of the central and northern portion of the European section of the country, the Urals, Siberia and the Far East with products derived from warmth-loving vegetable crops. The population's demand for late vegetable crops such as cabbage, table beets, carrots, radishes, rape and others will be satisfied basically by means of cultivating them in the zones in which they are consumed.

The most important industrial region of the country is the RSFSR Non-Chernozem Zone, in which over 61 million persons reside, including 76 percent in urban areas and 24 percent in villages.

The kolkhozes and sovkhoses of the RSFSR Non-Chernozem Zone annually produce over 30 percent of gross agricultural production and over 33 percent of gross vegetable production in the republic. Vegetable crops in all categories of enterprises occupy 198,000 hectares in the zone. Gross vegetable production was 3,152,500 tons in 1980 and productivity was an average of 160 quintals per hectare.

Twenty five percent of all vegetable crops in the republic were concentrated in kolkhozes, sovkhoses and other state enterprises of the Non-Chernozem Zone. In 1980 they produced over 28 percent of the vegetables raised in the USSR. Moscow and Leningrad oblasts alone annually produce 27 and 16 percent of the gross grain yield.

An analysis of the development of vegetable farming in the RSFSR Non-Chernozem Zone has enabled us to establish that many enterprises by far do not fully utilize existing possibilities for raising large harvests of vegetables. Thus, the average productivity of vegetable crops in kolkhozes, sovkhoses and other state enterprises in the zone comprised 156 quintals per hectare in 1980, whereas in Moscow and Leningrad oblasts it comprised 320-400 quintals per hectare, i.e. 2-2.5 times more than on the average within the zone. Many specialized sovkhoses of Moscow, Leningrad and Sverdlovsk oblasts produce 450-600 quintals of vegetables per hectare from one year to the next.

At the same time in a number of oblasts in the zone the productivity of vegetable crops does not exceed 100 quintals per hectare. Thus, in nine out of 29 oblasts and autonomous republics it comprises an average of 70 quintals

Table 2
Per Capita Vegetable Production
(kilograms, in all categories of enterprises, annual average) (1)

Republics	1961-1965	1976-1980	1976-1980, % of 1961-1965
USSR	73	99	135.6
RSFSR	66	75	113.6
Ukrainian SSR	110	151	137.3
Belorussian SSR	77	78	101.3
Lithuanian SSR	98	85	86.7
Latvian SSR	89	75	84.3
Estonian SSR	78	67	85.9
Georgian SSR	45	104	231.1
Azerbaijan SSR	47	135	287.2
Armenian SSR	73	142	194.5
Uzbek SSR	44	128	290.0
Kirghiz SSR	42	94	223.8
Tajik SSR	28	83	296.4
Turkmen SSR	50	90	180.0
Kazakh SSR	46	69	150.0
Moldavian SSR	125	297	237.6

per hectare (including 47 quintals per hectare in Yaroslav, Ryazan and Ivanovo oblasts), in seven--about 125, in eight--172 quintals per hectare and in only five--over 260 quintals per hectare. Such fluctuations in the productivity of vegetable crops attest not so much to differences in natural conditions as to insufficient attention to this important branch of agriculture.

Per capita vegetable production during the last 20 years has increased by 35.6 percent and comprised an average of 99 kilograms per year during the years of the 10th Five-Year Plan. The growth pace for vegetable production volume per capita differs significantly by different union republics. Thus, whereas in the Transcaucasus republics as well as in the Uzbek, Kirghiz, Tajik and Moldavian union republics per capita annual vegetable production during the 10th Five-Year Plan increased by a factor of 2-2.5, in the Baltic states there was a decrease in this indicator (Table 2).

State vegetable procurement increased from 16.0 million tons in 1976 to 18.4 million tons in 1978 and 17.7 million tons in 1980. Moreover, 32 percent of the vegetables procured in the country came from kolkhozes, 60 percent--from sovkhoses and other state agricultural enterprises and only 8 percent--from private plots.

In the RSFSR in the 10th Five-Year Plan as compared to the ninth the volume of vegetable procurement increased by 27.8 percent, comprising an annual average of 6,743,000 tons. However, this cannot satisfy the needs of the republic's population for the given products. On the average per capita procurement

Table 3
Volume and Structure of State Vegetable Procurement in
All Categories of Enterprises in the RSFSR (3)

Types of Vegetable Products	Average annual procurement volume, thousands of tons		Growth in Vegetable Procurement, %	Procurement Structure, %	
	1971-1975	1976-1980		1971-1975	1976-1980
Total vegetables	5,275	6,743	127.8	100	100
Including:					
Cabbage	2,338	2,739	117.2	44.3	40.6
Cucumbers	507	596	117.6	9.6	8.8
Tomatoes	1,042	1,365	131.0	19.8	20.2
Beets	253	361	142.7	4.8	5.4
Carrots	402	574	142.8	7.6	8.5
Onions-Turnips	377	541	143.5	7.1	8.1
Garlic	6	14	233.3	0.1	0.2
Other	350	553	192.7	6.6	8.2

equalled 54 kilograms of vegetables during the 10th Five-Year Plan in the RSFSR; this was about half of the recommended norm for consumption.

In addition to the growth in vegetable procurement during recent years there have been some changes in the structure of procured vegetable products (Table 3). During the 10th Five-Year Plan there was a slight drop in the proportion of procured cabbage and cucumbers but an increase in that of tomatoes, carrots, beets, onions-turnips as well as green and rare vegetables. The decrease in the proportion of procured cabbage and cucumbers occurred not as a result of a curtailment in their procurement but because of the rapid growth in the volume of procurement of other types of vegetable products.

Vegetable raising is one of the most intensive and labor-intensive branches of agriculture. The cost of fixed production funds for agricultural purposes comprise 260,000-300,000 rubles per 100 hectares of vegetable crops in specialized enterprises. With the introduction of industrial technology for the cultivation and harvesting of vegetable crops as well as irrigation this increases to 500,000-530,000 rubles, as research shows. Material-monetary expenditures per hectare of vegetable crops in sovkhozes and kolkhozes of the RSFSR in 1981 equalled 1,846.6 rubles, including in specialized enterprises--2,200 rubles. Direct labor expenditures for the production of 1 quintal of vegetables on open ground equalled 7.3 man-hours in kolkhozes in 1981-1982, in sovkhozes--4.9 man-hours, and were 3-6 times greater than for cultivating sugar beets (5).

An important condition for raising the economic effectiveness of vegetable production is the development of specialization and concentration in vegetable

farming, as well as a sequential intensification, development and introduction of industrial technology for cultivation and harvesting. The production of vegetables on an industrial basis implies the irrigation of crops, the selection of highly productive varieties, the strict observance of scientifically-based agrotechnology (introduction of vegetable crop rotations, combatting pests and diseases, applying organic and mineral fertilizers and so forth) and the introduction of complex mechanization.

At the present time the harvesting and post-harvest processing of cabbage, carrots, tomatoes, onions--turnips and green peas are mechanized. Multiple selective harvesting of vegetables that did not mature at the same time is effected with the aid of POU-2 platforms and TShP-25 broad transporters. The use of the latter, as studies show, enables us to increase labor productivity by a factor of 1.5-2.

Cabbage is harvested using the MSK-1 cabbage-harvesting combine, which fulfills operations such as the cutting and loading of heads of cabbage. A tractor operator and two workers service the combine and output equals 0.18 hectares per 1 hour pure time. Labor expenditures in this case are 4-5 times lower and direct cost--34 percent lower than with manual harvesting.

MMT-1 and YeM-11 machines as well as the PSK-6 sorting point are utilized in the harvesting of carrots using the flow method. The output of the YeM-11 is 0.1-0.2 hectares per hour of pure time and that of the PSK-6 point is up to 6 tons. The machine is serviced by a tractor operator and machinist, the sorting point--by 16-18 workers. The completeness of carrot harvesting using the machine reaches 90-97 percent. The shipment of carrots from the harvesting machine to the place of post-harvest processing is implemented by means of Belarus' tractors with 2PTS-4 tractor trailers or dumpers.

The use of a machine complex for the harvesting, shipment and post-harvest processing of carrots enables us to curtail labor expenditures per hectare from 1,160 to 450 man-hours and to decrease operational expenditures by a factor of 1.6 as compared with these indicators with existing technology.

The flow harvesting of tomatoes is performed by means of a machine complex consisting of a self-propelled SKT-2 combine, PT-3.5 trailers, a PVSV-0.5 loader and KON-0.5 container thrower. The tomatoes can be sorted either in the combine during harvesting or in a stationary SPT-15 sorting point. The output of the combine is 0.1-0.4 hectares and that of the sorting point is 15 tons per 1 hour pure time. The combine is serviced by the combine operator and 16 workers for sorting; the point--by 20 workers.

To harvest onions--turnips the LKG-1.4 digger is used; for the post-harvest processing of onions--the PML-6 mechanized point. The output of the machine is 0.4 hectares per hour of pure time for digging and 0.8 hectares for picking up. The PML-6 line processes up to 6 tons of onions per hour of pure time. The line is worked by 9-14 persons (7).

Table 4
Economic Effectiveness of Vegetable Production
With Existing and Recommended Technologies for Cultivating
Vegetable Crops (6)

Indicator	Cabbage		Carrots		Tomatoes		Onions-Turnips	
	Existing	Recommended	Existing	Recommended	Existing	Recommended	Existing	Recommended
Productivity, quintals per hectare	470	700	350	650	250	400	108	200
Labor expenditures per 1 quintal, man-hours	0.82	0.4	2.7	0.8	3.84	1.31	8.0	1.8
Cost of 1 quintal, rubles	1.74	1.17	1.85	1.15	3.81	2.50	18.3	5.9

From Table 4 it follows that the productivity of vegetable crops during cultivation and harvesting in accordance with the requirements of industrial technology is higher by a factor of 1.5-2.0 than with existing cultivation; labor expenditures per quintal of production are lower by a factor of 2-4 and cost is lower by a factor of 1.5-1.7. The level of profitability of vegetable farming comprises 50-60 percent.

Specialized sovkhoses of Moscow, Leningrad, Volgograd, Rostov, Penza and Gorkiy oblasts, Krasnodar and Stavropol krais of the RSFSR, the Ukrainian SSR and the Moldavian SSR achieved a high economic effectiveness in vegetable production. For example, in the Ramenskoy Sovkhoz of Moscow Oblast the productivity of white cabbage of the Amager variety comprised 650 quintals per hectare, labor expenditures dropped from 428 to 275 man-hours and the cost of 1 quintal dropped from 1.61 to 1.30 rubles. The annual economic effect from the introduction of industrial technology per hectare reached 1,060 rubles.

Positive experience in raising vegetables according to industrial methods was accumulated in the Omsk Agro-Industrial Association for Vegetable Production and Trade. In recent years the cultivation and harvesting of carrots have been fully mechanized. For this the enterprises of the association have 30 MMT-1 combines. Each such combine replaces 90-100 workers in harvesting and enables us to decrease harvesting time almost by half. Moreover, combine harvesting as compared to manual facilitates the curtailment of losses of carrots by 20-35 percent.

Table 5
Effectiveness of Vegetable Production in the
Volgo-Don Association of Volgograd Oblast (1976-1981)

Indicator	1976	1977	1978	1979	1981
Crop area, ha	581	606	645	639	621
Gross yield, thousands of tons	32.7	27.5	40.4	35.8	28.7
Productivity, quintals per hectare	564	455	626	561	463
Labor expenditures per quintal, man-hours	2.1	2.2	1.7	2.05	2.5
Cost of 1 quintal, rubles	7.02	7.36	6.85	8.75	10.67
Profits obtained, thousands of rubles:					
Total	1,625.8	1,498.4	2,717.3	1,771.5	1,454.4
Per hectare	2.8	2.5	4.2	2.8	2.3
Profitability level, %	68.5	69.7	99.8	52.6	37.0

An improvement of the technology for cultivating and harvesting vegetable crops in addition to the development of specialization and concentration of vegetable production in Leningrad Oblast encouraged an increase in the effectiveness of this branch within the association. During the years of the 10th Five-Year Plan enterprises received 28.2 million rubles in profits from the sale of fruit and vegetable products, or 5.6 million rubles per year on the average. In 1981 cabbage was harvested using the mechanized method on an area of 539 hectares (12 percent of total production volume), carrots--on 321 hectares and table beets--on 190 hectares, and in the Detskosel'skiy and Predportovyy sovkhoses mechanized harvesting of cabbage and carrots was implemented on 20 and 62 percent of the total area in these crops.

Industrial technology for cultivating and harvesting vegetables is being successfully introduced in the Volgo-Don Association of Volgograd Oblast. To harvest cucumbers, tomatoes and cabbage in the enterprises of the association broad transporters are used, enabling workers to harvest produce and at the same time to load it into trucks. Up to 25,000 tons of vegetables are harvested in this way each year in the association. The use of complex mechanization in the enterprises of the association has enabled us to significantly curtail labor expenditures per unit of vegetable production (Table 5).

A slight drop in the effectiveness of vegetable production in the association in 1981 as compared to the preceding years can be explained by the unfavorable

meteorological conditions existing during the planting and sowing of vegetable crops (due to low temperatures in May some of the crops were resown).

The use in vegetable harvesting of broad transporters significantly eases labor and eliminates manual processes such as removing the produce from the fields and loading it. In the harvesting of cucumbers and tomatoes in this case up to 10,000 man-days are saved each year.

The production of tomatoes on an industrial basis is being introduced in Tishchenskiy Sovkhoz of Stavropol Kray. With the flow method of harvesting using the SKT-2 combine the annual savings on labor reaches 7,000-8,000 man-days (35,000-38,000 rubles of wages). In 1977-1981 the productivity of tomatoes in the sovkhos equalled 196-334 quintals per hectare, which is higher by a factor of 1.3-1.5 than in other enterprises in the kray. Labor expenditures per 1 quintal of tomatoes harvested by the flow method were lower by a factor of 4 than those with manual harvesting and carrying to the edge of the field.

The further introduction of industrial technology and an increase in the effectiveness of the production of vegetable crops is tied to the creation of complexes for the harvesting, shipment and primary processing of vegetables, to improving agricultural methods and to the development of new varieties of vegetable crops which have all of the characteristics that satisfy the requirements for machine harvesting.

In specialized vegetable farming enterprises of Leningrad Oblast the productivity of vegetable crops is higher by a factor of 1.7-1.8 than in non-specialized; the expenditure of labor and resources per unit of production is lower by 35-50 percent (Table 6).

In enterprises with a high level of specialization and concentration in vegetable production the level of profitability is higher than in the branch as well. Within the group of sovkhoses with a production volume greater than 25,000 tons of vegetables profitability comprised 95.0 percent, whereas in enterprises with a gross production up to 5,000 tons it comprises 11 percent. The effectiveness of producing various types of vegetables is not the same by far in the republics and economic regions. Thus, the cultivation of white cabbage, cucumbers and table beets is more effective in the Kirghiz SSR (profit level of 65, 60 and 40 percent respectively), of tomatoes--in the Moldavian SSR (61 percent), of onions--turnips--in the Ukrainian SSR (47 percent) and of carrots--in the RSFSR (53 percent).

In solving problems relating to the continued improvement in effectiveness of vegetable production and to a more complete satisfaction of the needs of the population for vegetable products the accelerated development of the agro-industrial vegetable complex is of primary importance. The text of a speech by Comrade Yu. V. Andropov at the December 1983 Plenum of the CPSU Central Committee points to the necessity to "increase the use of the potential created within agriculture and to increase the return on resources that are directed at the development of the agro-industrial complex with the goal of completely solving the problems of supplying the population with food products..."¹ An

¹ PRAVDA, 27 Dec 83.

Table 6
Effectiveness of Vegetable Farming Depending on Level of
Concentration in Vegetable Production in the
Enterprises of Leningrad Oblast, 1981

Indicator	Group according to gross yield of vegetables, per one enterprise, thousands of tons				Average results
	Up to 5.0	5.1-15.0	15.1-25.0	over 25.0	
Number of enterprises	6	3	7	4	20
Sowing area per enterprise	110	362	676	926	462
Gross vegetable yield per enterprise, thousands of tons	2.0	10.1	20.5	33.9	16.2
Productivity, quintals/hectare	181	276	303	366	284
Labor expenditures per quintal, man- hours	2.1	1.7	1.9	1.3	1.7
Cost of 1 quintal, rubles	7.06	6.22	5.81	4.85	5.84
Average sales price per quintal, rubles	7.84	8.97	8.98	9.46	8.78
Profit level, %	11.0	44.2	54.6	95.0	50.1

important role in the development of the agro-industrial vegetable sub-complex is to be played by the USSR Ministry of the Fruit and Vegetable Industry, created in 1980 and heading the administrations of ministries of fruit and vegetable industries of union republics and agro-industrial associations in oblasts, krays and autonomous republics. The basic goal of ministries of the fruit and vegetable industry and agro-industrial associations is not only the organization of the cultivation, processing and storage of fruit and vegetable products but also selling them in fresh form.

The uniform consumption of vegetable products by the population in the course of the entire year can be achieved by means of the efficient coordination of vegetable production on open and closed ground and of the long-term and short-term storage of vegetables as well as by means of improving the technology for processing them. In connection with this an important role is attributed to vegetable farming on enclosed ground, which is called upon to supply the needs of consumers for fresh produce during the winter-spring and late fall periods. Calculations show that 10-12 percent of the vegetable products consumed by the population should be raised on enclosed ground. Consequently, consumption of such vegetables per capita should comprise 11-13 kilograms per year.

In 1970 in the country as a whole enclosed ground facilities produced about 350,000 tons of vegetables, or 1.7 percent of the total volume of vegetable

products raised, and per capita--1.4 kilograms. In 1980 production increased by a factor of 2.8, reaching 980,000 tons, which comprises 3.8 percent of all vegetables cultivated, and per capita--3.7 kilograms.

The increase in gross vegetable production in enclosed facilities was based on the expansion of area and an increase in productivity. In 1980 as compared to 1970 the area of such facilities had increased by a factor of 1.6 and equalled 12,800 hectares, with the area of winter hothouses increased by a factor of almost 4.2 and of spring coverings--by a factor of 3.2; at the same time there was a decrease in the area of hotbeds (4).

The proportion of hothouses within the structure of all enclosed ground facilities comprised 27 percent in 1970 and about 61 percent in 1980. Among the latter there is a predominance of spring coverings with fewer winter hothouses (40 and 21 percent respectively). Winter hothouses are characterized by a more intensive utilization of area and enable us to expand the period in which vegetable products can enter the trade network. Here the productivity of vegetables is almost threefold higher than in spring covering hothouses (on the average for 1976-1980 in all categories of enterprises--20.2 and 6.7 kilograms per square meter respectively (4)).

In winter hothouses there are lower labor expenditures per unit of production, which is related to the possibility of using complex mechanization and the automation of production processes and to the comparatively greater output of produce per unit of area. The cost of vegetable production here is lower than in spring hothouses, hotbeds and heated ground.

In recent years the role of spring covered hothouses has decreased somewhat with regard to vegetable production basically because of the later output of products as compared to winter hothouses. However, we should not forget a number of advantages of spring hothouses--small capital investments for building them and a relatively small consumption of fuel and energy resources.

The further growth of production of vegetables on enclosed ground must be based on the optimal coordination of areas of winter and spring hothouses and on the utilization of all types of structures.

Vegetable farming on enclosed ground is a specific branch of agricultural production. It differs from other branches in the special means of production, in the technology of production processes and in labor organization.

In raising vegetables on enclosed ground we must consider the important climatic factor of total photosynthetic active radiation (FAR), which penetrates the hothouse. FAR levels are especially low during the winter months (December, January)--35 kilocalories per square meter in Arkhangelsk, Leningrad and other northern oblasts of the country, 568 kilocalories per square meter in Simferopol and 765 kilocalories per square meter in Kislovodsk, Korovabad, Tbilisi, Yerevan, Dushanbe, Frunze and other southern regions of the country.

The USSR can be divided into seven light zones according to the quantity of FAR. Zone I includes large cities and industrial centers such as Arkhangel'sk,

Leningrad, Riga and Petrozavodsk; Zone II--Kostroma, Ivanovo, Gorkiy, Cheboksary; Zone III--Moscow, Minsk, Kazan', Sverdlovsk, Ufa and Krasnoyarsk; Zone IV--Kuybyshev, Kiev, Chelyabinsk, Novosibirsk and Kemerovo; Zone V--Saratov, Volgograd, Irkutsk and Orenburg; Zone VI--Simferopol', Makhachkala, Ulan-Ude, Chita and Komsomol'sk-na-Amure; and Zone VII--Kislovodsk, Kirovabad, Ashkhabad, Samarkand, Frunze, Vladivostok and others.

The lack of uniformity in the amount of FAR in various light zones creates different possibilities for cultivating cucumbers and tomatoes in enclosed-ground facilities during the winter and early spring periods. Thus, cucumber plants bear fruit in early March in Zone I and in early November in Zones VI and VII.

The distribution of hothouse combines throughout the country should be implemented with a consideration of the possibilities for cultivating cucumbers, tomatoes and green and rare vegetables in the out-of-season period. As practical experience shows, the cultivation of vegetable crops in winter glass hothouses in Zones I-IV in November-January is impossible without artificial lighting for the seedlings.

The largest areas of enclosed-ground facilities are located in Zones VI and VII as well as around large cities and industrial centers in Zones III-V. In the RSFSR we find 53 percent of the area of winter hothouses in the country; in the UkSSR--14 percent.

Large hothouse combines are located around Moscow (Moskovskiy Sovkhoz--54 hectares, Vesna Association--110 hectares), Leningrad (Leto Association--81.1 hectares), Voronezh (Sovetskiy Sovkhoz--21.5 hectares), Lipetsk (Teplichnyy Sovkhoz--21.5 hectares), Ufa (Ufimskiy Sovkhoz--30 hectares), the Tatar ASSR (Mayskiy Sovkhoz--28 hectares and Vesenniy Sovkhoz--27.3 hectares), around Novosibirsk (Kirovets Sovkhoz--20.9 hectares) and others. During the spring-winter period they secure the delivery of 5-7 kilograms of vegetables per capita with a high level of economic effectiveness in raising vegetables.

Thus, an analysis of the effectiveness and distribution of vegetable production in the USSR allows us to draw the following conclusions:

1. Further growth in vegetable production in the near future must be realized at a higher pace than during the 10th Five-Year Plan--during the period to 1990 it must be no lower than 4-5 percent as compared with 2.6 percent in 1976-1980.
2. With relatively stable sizes of sowing areas for vegetable crops an increase in vegetable production can be achieved basically by a consistent intensification of the branch, securing a significant increase in productivity, which must increase by a factor of 1.3-1.4 during this period and be no less than 200-220 quintals per hectare.
3. With the efficient distribution of vegetable products according to natural-climatic zones it is essential to consider the possibility of raising various types of vegetable crops with fewer expenditures of labor and resources.

The introduction of industrial technology to cultivate vegetables and harvest them enables us to decrease labor expenditures by a factor of 2-4 and to decrease the cost of a unit of production by a factor of 1.5-1.7.

4. In order to secure a more uniform supplying of the population with vegetable products in the course of the year the average annual production of vegetables in enclosed-ground facilities should in the future be increased by a factor of 2.7-3.2 and brought up to 3.5-4.0 million tons. While this occurs there should be an increase in the gross yield of early and green vegetables.

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